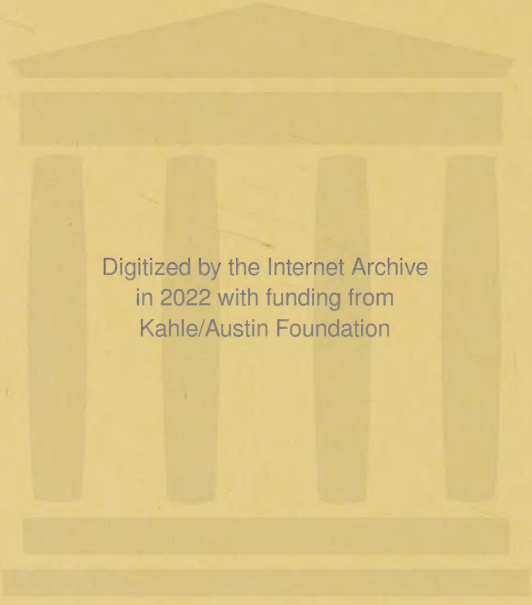
FM 21-76

DEPARTMENT OF THE ARMY FIELD MANUAL

SURVIVAL EVASION AND ESCAPE

HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 1969



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***FM 21–76**

FIELD MANUAL
No. 21–76

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 March 1969*

SURVIVAL, EVASION, AND ESCAPE

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CHAPTER 1

INTRODUCTION

1–1. Purpose and Scope

This manual, together with a classified joint services manual, FM 21–77A, provides a basis for survival, evasion, and escape training conducted in the U.S. Army. It is for the information, guidance, and use of all U.S. Army personnel, and the material is applicable in general war, limited war, and cold war to include stability operations. For ease and convenience to the reader and continuity of expression, this material is presented in three parts:

a. Part One, Survival. When the primary duty of the soldier is to stay alive, and when there is little or no threat from an enemy.

b. Part Two, Evasion. When the probability of capture by an enemy is high, and when the duty of staying alive is complicated by the additional duty of evading the enemy.

c. Part Three, Escape. When capture is a fact, the soldier's primary duty is to escape and return to friendly control by use of evasion and survival techniques described in parts One and Two.

1–2. General

Survival, evasion, and escape areas are extensions of the battlefield, and the individual soldier must be

provided specific training to acquire the basic knowledge and skills. In addition, he must be not only properly indoctrinated and motivated to take appropriate action on his own, but also mentally and spiritually prepared to follow the orders of his leaders.

1–3. Objectives

a. Train the soldier in the principles and techniques of survival and evasion.

b. Enhance the soldier's confidence in his ability to survive, evade, and/or escape.

c. Familiarize the soldier with the techniques of planning and executing escape, evasion, and survival maneuvers.

d. Familiarize the soldier with the leadership and organization required within prisoner of war (PW) camps to facilitate successful escape, evasion, and survival.

e. Familiarize the soldier with enemy interrogation, indoctrination, and exploitation methods and procedures.

f. Instill in the soldier an understanding of his security obligation upon return to friendly control.

1–4. Individual Soldier Responsibilities

a. When isolated from his unit in the course of combat operations, the individual soldier is obligated to continue to fight, survive, and/or evade capture so as to rejoin friendly forces.

b. Meet the standards of the code of conduct.

1–5. Changes

Users of this manual are encouraged to submit recommendations to improve its clarity or accuracy. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commandant, U.S. Army Special Warfare School, Fort Bragg, North Carolina 28307. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy, through command channels, to Commanding General, U.S. Continental Army Command, Fort Monroe, Virginia 23351, to facilitate review and followup.

PART ONE

SURVIVAL

CHAPTER 2
GENERAL

Section I. CONSIDERATIONS

2–1. The Will to Survive

The experiences of hundreds of servicemen isolated during World War II, Korean, and Vietnam combat prove that survival is largely a matter of mental outlook. The will to survive is the most important factor. Whether with a group or alone, emotional problems resulting from shock, fear, despair, loneliness and boredom will be experienced. In addition to these mental hazards, injury and pain, fatigue, hunger, or thirst tax the will to live. If you are not prepared mentally to overcome all obstacles and to expect the worst, the chances of coming out alive are greatly reduced.

2–2. Survival Actions

a. If You Are Alone. The shock of being isolated behind enemy lines, in a desolate area, or in enemy hands can be reduced or even avoided if the key word S–U–R–V–I–V–A–L and the survival tips

keyed to the individual letters of the word (fig. 2–1) are remembered.

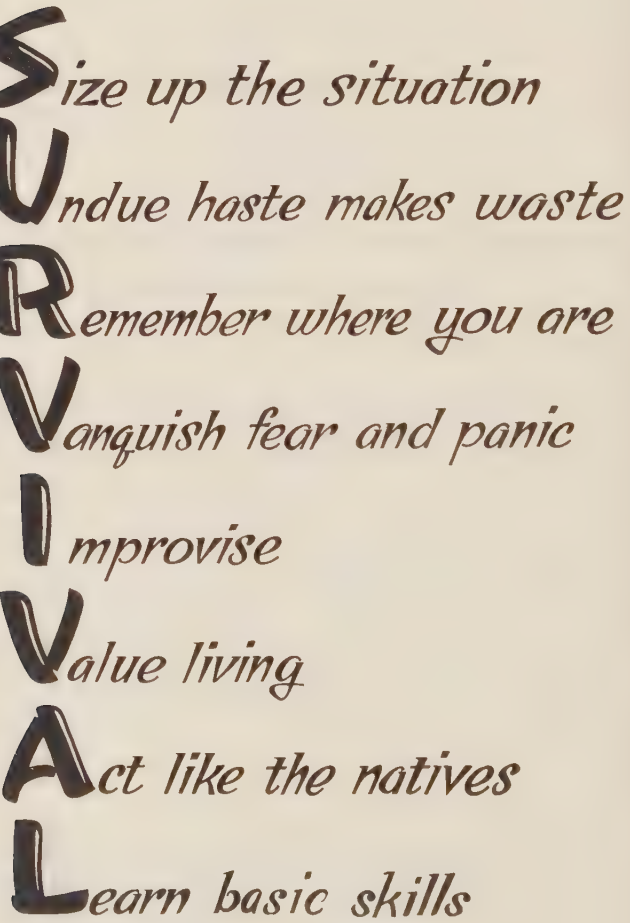

Figure 2–1. Survival.

b. The Group. As individual reactions to survival situations become automatic, so must those of the group. Groups such as squads or platoons that work together and have leaders that fulfill their responsibilities have the best chance for survival. If your group considers the following factors while evading capture, the odds of returning to friendly control are greatly improved.

(1) Organize group survival activities.

(2) Recognize one leader.

(3) Develop a feeling of mutual dependence within the group.

(4) No matter what the situation, the leader must make the decisions.

c. Use Natives. With few exceptions, most areas in which isolation may occur have some local inhabitants. Primitive natives and tribal groups in isolated noncombat areas are usually not hostile; however, approach and use them with caution. They know the country, its available water, shelter areas, food, and the way back to civilization. Be careful not to offend them. They may save your life. To enlist native help, use these guides:

(1) Let the natives make the initial contact. Deal with the recognized headman or chief to get what is needed.

(2) Show friendliness, courtesy, and patience. Do not show fright; do not display a weapon.

(3) Treat natives like human beings.

(4) Respect their local customs and manners.

(5) Respect personal property, especially their women.

(6) Learn from the natives about woodcraft and getting food and drink. Seek their advice concerning local hazards.

(7) Avoid physical contact without seeming to do so.

(8) Paper money is worthless in many places. Hard coin is good. Also, items such as matches, tobacco, salt, razor blades, empty containers, or cloth may be valuable bartering items. One word of caution—do not overpay.

(9) Leave a good impression. Other men may need this help.

Section II. NAVIGATION

2–3. Where Are You

a. Isolation on Land Close to the Frontlines. If cut off from your unit, try to remember the location of friendly forces. Then travel in that direction, using the sun and stars as directional guides. In northern latitudes, the North Star (Polaris) may be used; in southern latitudes, the Southern Cross.

b. Isolation in a Desolate Area or Deep in Enemy Territory.

(1) If aboard a plane which is forced down over land, you can remain oriented by knowing the direction of flight and something about the country over which you were flying.

(2) If abandoning a ship at sea or an aircraft over a large body of water, and time permits, find out—

(*a*) The bearing and azimuth to the nearest land.

(*b*) The latitude and longitude.

(*c*) Prevailing wind direction.

(*d*) Direction of flow of ocean currents.

(*e*) Direction and distance of nearest shipping lanes.

(3) Should you be an escapee from a PW inclosure deep in enemy territory and unable to pinpoint your location, seek a hideout: sit down, relax, and think over the situation. Try to recall landmarks seen on your trip to the enemy rear.

c. Isolation Near a Populated Area in Enemy Territory. Although populated areas in a contested or enemy controlled zone should be avoided, it may be practical to approach an area during the hours of darkness in order to read a milestone or road sign to orient oneself. This method would be most useful when it is necessary to travel a long distance, but should not be utilized if it would entail high risk of capture or exposure. Approach of a populated area, even at night, should not be undertaken unless there is no reasonable alternative and there is certainty that the information will aid in determining location.

2–4. Finding Yourself Using a Map

See FM 21–26.

2–5. Guiding by Sun and Stars

*a. Finding Direction by Day.**

(1) If you do not have a compass, you can use the sun to find approximate true north (and from

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north, any other direction). The method explained below can be used any time the sun is bright enough for a stick placed in the ground to cast a shadow (fig. 2–2).

(*a*) *Steps to follow.* Find a fairly straight stick about 1 meter long and follow these steps:

Step 1: Push the stick into the ground at a fairly level, brush-free spot where a distinct shadow will be cast. The stick need not be vertical; inclining to obtain a more convenient shadow, in size or direction, does not impair the accuracy of the shadow-tip method.

Step 2: Mark the shadow *tip* with a small peg, stick, stone, twig, your finger, hole in the snow, or other means. Wait until the shadow tip moves a few inches—using a 1 meter stick, 10 to 15 minutes should be sufficient.

Step 3: Mark the new position of the shadow *tip*.

Step 4: Draw a straight line from the first rock to the second rock and extend it about a foot past the second rock.

Step 5: Stand with the toe of the *left* foot at the first rock and the toe of the *right* at the end of the line you drew.

(*b*) *You are now facing north.* Find other directions by recalling their relation to north. To mark directions on the ground (as for the purpose of orienting others), draw a line across the first line, forming a cross (+) and mark the directions.

(*c*) *Basic rule for direction.* If you are ever uncertain of whether to place the left or the right

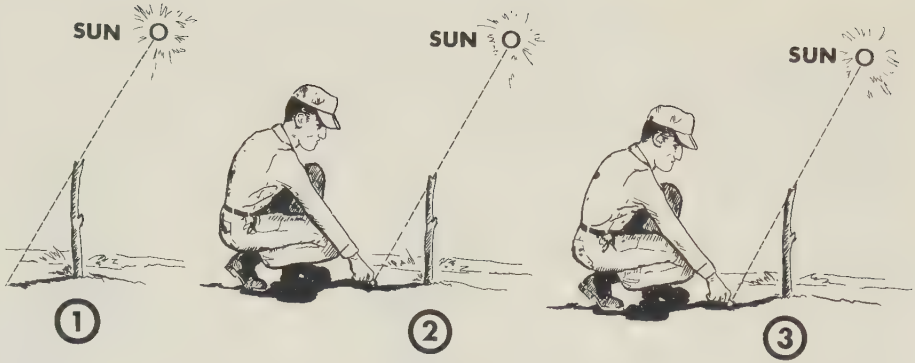
SUN
SUN
SUN
1
2
3
Push the stick into the ground at a level spot, so that it is straight up and down, notice that the stick cast a shadow
Mark the tip of the shadow with a small rock and wait until the shadow moves a few inches 10—15 minute.
Mark the tip of the second shadow.

Figure 2–2. Finding direction by shadow-tip method.

Draw a line from the first rock to the second rock and about a foot past the second rock

Stand with the toe of your left foot at the first rock and the toe of your right foot at the end of the line you drew

You are now facing north

Figure 2–2.—Continued

foot on the first rock (see Step 5 above), remember this basic rule for telling East from West:

> The sun rises in the east and sets in the west (but rarely due east and due west). The shadow tip moves just the opposite. Therefore, the first shadow tip mark is always in the west direction and the second mark in the east direction, EVERYWHERE on earth.

(2) An ordinary watch can be used to determine the approximate true north (fig. 2–3). In the North Temperate Zone only, the hour hand is pointed toward the sun. A north-south line can be found midway between the hour hand and 12 o'clock. This applies to standard time. For daylight saving time, the north-south line is found midway between the hour hand and 1 o'clock. If there is any doubt as to which end of the line is north, remember that the sun is in the north, remember that the sun is in the eastern part of the sky before noon and in the western part in the afternoon. The watch may also be used to determine direction in the South Temperate Zone. However, it is used a bit differently. Twelve o'clock is pointed toward the sun, and halfway between 12 o'clock and the hour hand will be a north-south line. If on daylight saving time, the north-south line lies midway between the hour hand and 1 o'clock. The temperate zones extend from latitude $23\frac{1}{2}°$ to $66\frac{1}{2}°$ in both hemispheres. On cloudy days, place a stick at the center of the watch and hold it so that the shadow of the stick falls along the hour hand. One-half the distance between the shadow and 12 o'clock is north.

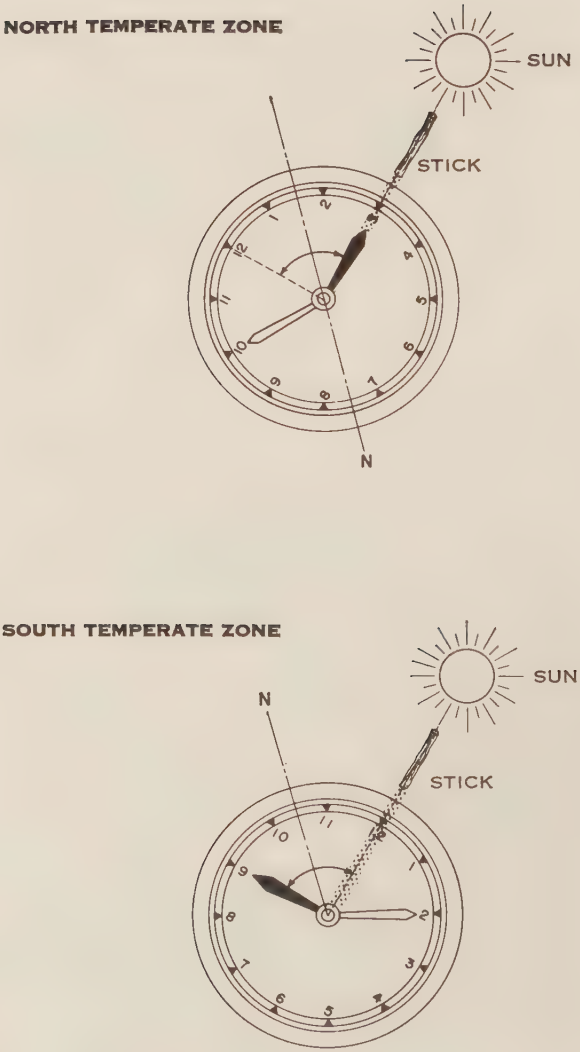

Figure 2–3. Using a watch to find North.

b. Finding Direction at Night. Direction can be determined by means other than a compass:

(1) To find the North Star, look for the Big Dipper. The two stars at the end of the bowl are called the "pointers." In a straight line out from the "pointers" is the North Star (at about five times the points). The Big Dipper rotates slowly around the North Star and does not always appear in the same position (fig. 2–4). The constellation Cassiopeia can also be used. This group of five bright stars is shaped like a lopsided M (or W, when it is low in the sky). The North Star is straight out from the center star, about the same distance as from the Big Dipper. Cassiopeia also rotates slowly around the North Star and is always almost directly opposite the Big Dipper. Its position, opposite the Big Dipper, makes it

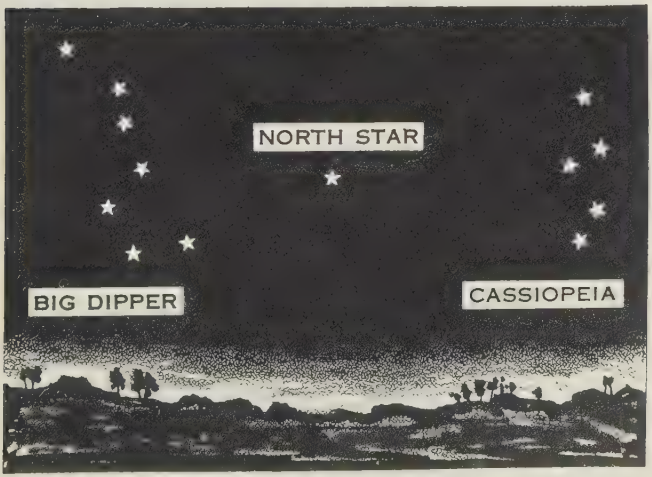

Figure 2–4. The Big Dipper.

a valuable aid when the Big Dipper is low in the sky, possibly out of sight because of vegetation or high terrain features.

(2) South of the equator, the constellation Southern Cross will help you locate the general direction of south and, from this base, any other direction. This group of four bright stars is shaped like a cross that is tilted to one side. The two stars forming the long axis, or stem, of the cross are called the "pointers." From the foot of the cross, extend the step five times its length to an imaginary point (fig. 2–5). This point is the general direction of south. From this point, look straight down to the horizon and select a landmark.

* *c. Determining Time.* The Shadow-Tip Method previously described (fig. 2–2) can also be used to find the approximate time of day, as follows:

(1) Move the stick to the intersection of the east-west line and the north-south line, and set it vertically in the ground. The west part of the line indicates 0600 hours, and the east part is 1800, ANYWHERE on earth, because the basic rule, described in *b* (1) (*c*) above always applies.

(2) The north-south line now becomes the noon line. The shadow of the stick is an hour hand in the shadow-clock and with it you can estimate the time using the noon line and the 6 o'clock line as your guides (fig. 2–6). Depending on your location and

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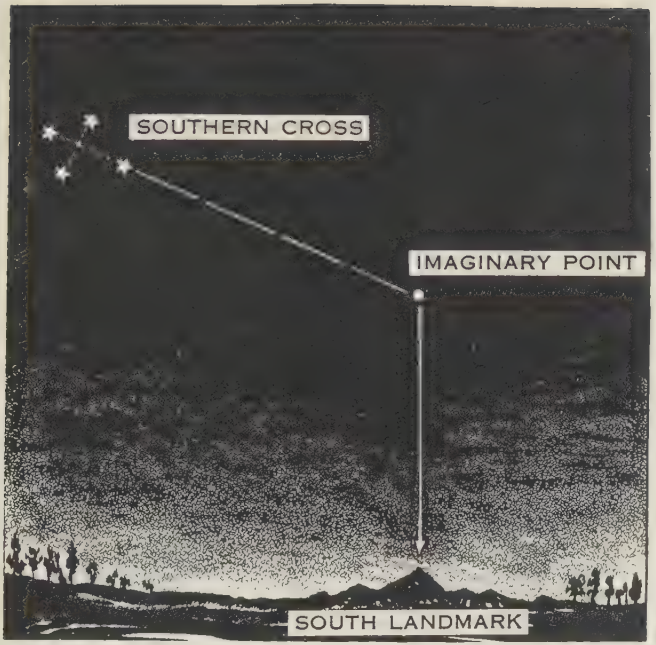


Figure 2–5. Southern Cross.

the season, the shadow may move either *clockwise* or *counterclockwise*, but this does not alter your manner of reading the shadow-clock.

(3) The shadow-clock is not a timepiece in the ordinary sense. It makes every day 12 unequal "hours" long, and always reads 0600 at sunrise and 1800 at sunset. However, it does provide a satisfactory means of telling time in the absence of watches (which is the usual case with escaped prisoners of war) or properly set watches. Being able to establish

time of day is important for such purposes as keeping a rendezvous, pre-arranged concerted action by separated persons or groups, estimating the remaining duration of daylight, and so forth. Twelve o'clock shadow-clock time is always true midday, but the spacing of the other hours, compared to conventional time, varies somewhat with the locality and the date.

(4) The watch method (fig. 2–3) very seriously can be in error, especially in the lower latitudes, and may cause "circling." To avoid this, set your watch to shadow-clock time and then use the watch method. This eliminates the 10-minute wait required to complete a shadow-tip reading for direction and thereby permits you to take as many instantaneous readings as necessary to avoid "circling." After traveling for an hour or so, take a check shadow-clock reading and reset your watch if necessary.

(5) The direction obtained by this modified watch method is the same as that of the regular shadow-tip method using a stick. That is, the degree of accuracy of both methods is identical.

2–6. Route Selection

a. The selected route of travel depends upon the situation, the weather conditions, and the nature of the terrain. Whether a ridge, stream, valley, dense forest, or mountain range is selected, be sure it is the safest, rather than the easiest way.

b. Rate of Travel.

(1) Plan and accomplish each day's travel so that enough time and energy are left to establish a secure and satisfactory campsite. Rest and sleep are extremely important during travel.

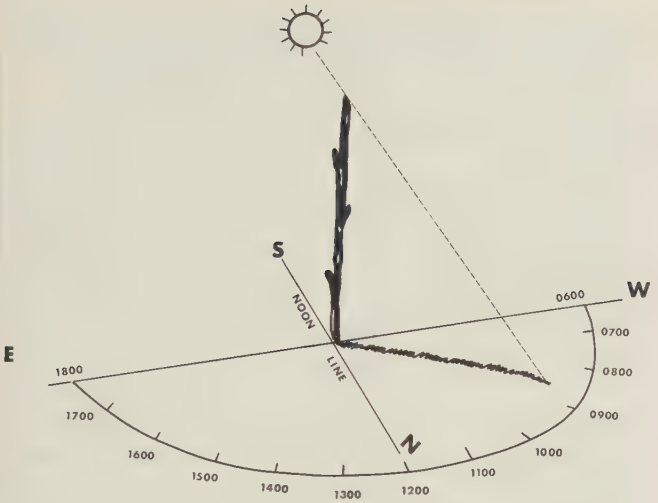


Figure 2–6. Determining time by the shadow-tip method.

(2) The rate of travel will be determined by a number of factors—

(a) Climatic conditions, e.g., temperature, sun, wind, rain, snow, etc.

(b) Your physical condition and that of your companion(s).

(c) The terrain (angle of slope and type of footing).

(d) The location of the enemy, his characteristics, number, and possible knowledge of your location.

(e) Time and distance requirements. Must a certain place be reached by a prescribed time?

(f) The amount of equipment carried. Carry only what is needed.

(g) Food requirements. Hunt and gather food during travel. This should reduce the need to undertake special travel to fulfill food requirements.

2–7. Following a Ridge

Follow a route parallel to a ridgeline, but directly below it. Game trails are frequently on top of ridges, and may be used as travel guides. Also you find less vegetation and frequent vantage points for locating landmarks.

2–8. Following Streams

Using a stream as a route or as a guide is of particular advantage in strange country because it provides a fairly definite course and generally leads to populated areas; it is a potential food and water source, as well as a route for travel by boat or raft. Be prepared, however, to ford, detour, or cut through the thick vegetation lining the stream. Also remember that observation by the enemy is more likely while traveling on streams in hostile areas. If following a stream in mountainous country, look for falls, cliffs, and tributaries as checkpoints. In flat country, streams usually meander, are bordered by swamps, and are thick with undergrowth. Travel on them provides little opportunity to locate landmarks.

2–9. Following Coast or Shorelines

Following a coastline is a long roundabout route, but it is a good reference point from which to get your bearings, and it also provides a probable source of food.

2–10. Through Dense Vegetation

a. With practice, movement through thick undergrowth and jungle can be done silently by cautiously parting the vegetation. Sleeves worn down will help avoid cuts and scratches.

b. Further avoid scratches, bruises, and loss of direction and confidence by developing "jungle eye." Disregard the pattern of trees and bushes directly to the front. Focus the eyes beyond your immediate front, and rather than looking AT the jungle, look THROUGH it. Stoop occasionally and look along the jungle floor.

c. Keep alert by moving slowly and steadily in dense forests or jungles, but stop periodically to listen and take your bearings. Use a bayonet or machete to cut through dense vegetation, but do not cut unnecessarily. Noise carries a long distance in the woods and can be reduced by stroking upward when cutting creepers and bush. A stick or staff can be used to part the vegetation to reduce the possibility of dislodging fire ants. DO NOT grab at brush or vines when climbing slopes, they may have irritating spines or sharp thorns.

d. Many jungle and forest animals follow well-established game trails. These trails wind and criss-cross but frequently lead to water or clearings. Normally they are observed by the enemy and should be avoided when possible. If used, do not follow them blindly. Make sure they lead in the desired direction of travel by checking your bearings frequently.

e. When climbing a tree to observe or get food, remain close to the trunk because limbs are strongest at this point.

2–11. Power Lines

In many countries, electric and telephone lines run for miles through sparsely inhabited countryside. Usually the right-of-way is sufficiently clear to afford ease of travel. When guiding or traveling along these features, care must be taken when approaching transformer and relay stations which will probably be protected by guards.

2–12. Mountains

a. General. Travel in mountains or other rugged country can be dangerous and confusing unless you know a few tricks. What looks like a ridgeline from a distance might be a series of ridges and valleys. In extremely high mountains, a snowfield or glacier that appears to be continuous and easy to traverse might cover a sheer drop of hundreds of feet. In jungle mountains, trees growing in valleys formed by streams reach great heights, and their tops are at about the same level as trees growing on the valley slopes and hilltops where the water is scarce; this forms a tree line that from a distance appears level and continuous. Mountain travel consumes a great deal of energy and should be avoided when you have a logical choice of routes.

b. Mountainous Terrain. Follow valleys or ridges in mountainous terrain. To save time and energy during mountain walking, keep the body weight directly over the feet by placing the soles of your shoes flat on the ground. If small steps are taken and your movement is slow, but steady, this is not difficult.

c. Picking the Route. Travel may be up or down

a steep slope or cliff. Before starting, pick your route carefully, making sure it has places for hand or foot holds from top to bottom. Try out every hold before placing weight on it, and keep your weight distributed. Keep the following hints in mind:

(1) Unless necessary, do not climb on loose rock.

(2) Move continually, using the legs to lift your weight and the hands to keep your balance. Try to maintain three points of contact; only move one hand or one foot at a time.

(3) Be in a position to go in either direction at any time without danger.

(4) In climbing down, face out from the slope as long as possible. This is the best position from which to choose routes and holds.

(5) Rappel when descending steep slopes, if an easier route for descent in not available (*e* below).

d. Equipment for Descending Slopes. When traveling in mountainous country, or over snow or ice, make an effort to acquire a rope and an ice axe. The job of descending steep slopes will be difficult or even impossible without them. If available, improvise a rope from parachute suspension lines and obtain a sturdy pole as a substitute for an ice axe.

e. Hasty Rappel. Anchor the rope around a tree or rock, allowing the ends to hang evenly. Facing slightly sideways to the anchor, place the double rope across your back and under your arms. The hand nearest the anchor is the guiding hand and the lower hand does the braking. To stop, bring the braking hand across the front of your body, lock-

ing the rope. At the same time, turn to face toward the anchor point. After reaching the bottom, pull one strand of the doubled rope to retrieve it. Use this rappel only on moderate pitches or on very long, gentle slopes. Its main advantage is that it is easier and faster to use, especially when the rope is wet. Rappels and other mountaineering techniques are discussed in FM 31–72.

2–13. Snowfields and Glacier Travel

a. The quickest way to descend a steep snowfield is to slide down on your feet, using an ice axe or a stout stick about five feet long as a brace and to dig into the snow to stop any falls. The ice axe or stick also may be used to probe for deadly crevasses (cracks in the ice).

b. When traveling on a glacier, crevasses generally are found at right angles to the direction of glacier flow. Usually it is possible to travel around them since they seldom extend completely across the glacier. If snow is present, the greatest caution must be exercised, and a rope should be used to secure each party member. Avoid heavily crevassed areas and glaciers whenever possible.

c. Travel up or across a steep slope covered with snow is made easier by kicking steps into the slope when moving diagonally across it; but, be on the alert for avalanches, especially during a spring thaw or after a fresh snow. When moving where there is danger of avalanches, stay out of the valley away from the base of the slope, or if a slope must be crossed, cross as high as possible. When climbing the slope, climb straight up. If caught in an avalanche, use swimming motions to stay on top.

d. Overhanging projections formed by snow blowing from the windward side of a ridge are additional hazards to travel in mountainous snow fields. The projections, or cornices, will not support your weight. These can usually be spotted from the leeward side, but from the windward you may see only a gently rounded snow-covered ridge. Follow the ridge on the windward side well below the cornice line.

2–14. Crossing Water

a. General.

(1) Except for travel in the desert, there is a good possibility that you will have to ford a stream or river. The water obstacle may range from a small, ankle-deep brook that flows down a side valley to a rushing, snow- or ice-fed river. A person who knows how to cross such an obstacle can use the roughest of waters to advantage. Before entering the water, however, check the temperature. If it is extremely cold and if a shallow fording place cannot be found, it is not advisable to try to cross by fording. The cold water may easily cause a severe shock, which can cause temporary paralysis. In this case, try to make an improvised bridge by felling a tree over the stream or building a simple raft.

(2) Before attempting to ford, move to high ground and examine the river for—

(*a*) Level stretches where it breaks into a number of channels.

(*b*) Obstacles on the other side that might hinder travel. Pick a spot on the opposite bank where travel will be easier and safer.

(*c*) A ledge of rocks that crosses the river, indicating the presence of rapids or canyons.

(*d*) Any heavy timber growths. These indicate where the channel is deepest.

(3) When selecting a fording site, keep the following points in mind:

(*a*) When possible, choose a course leading across the current at about a 45° angle upstream.

(*b*) Never try to ford a stream directly above or close to a deep or rapid waterfall or deep channel.

(*c*) Always ford where you would be carried to a shallow bank or sandbar should loss of footing occur.

(*d*) Try to avoid rocky places, since a fall can cause serious injury; however, an occasional rock that breaks the current may help you.

b. Methods of Crossing.

(1) *Wading.* Before entering the remove your socks and put your shoes back on. Do not risk the chance of having your feet cut by sharp rocks or sticks. Use a stout pole for support. Keep it upstream as much as possible to help break the current. The pole also makes footing more secure and can be used to test for potholes.

(2) *Swimming.*

(*a*) Use the breast, back, or side strokes. They are noiseless, less exhausting than other techniques, and will allow you to carry small bundles of clothing and equipment while swimming. If possible, remove clothing and equipment and float it across the river. Wade out until the water is chest deep before swimming. If the water is too deep to wade, lower yourself slowly to minimize the possibility of snags

and falls due to obstacles hidden under the water. In deep, swift water swim diagonally across the stream with the current. Where concealment is important, use brush from the bank.

(*b*) If unable to swim, you can ford a river by using certain swimming aids. These include—

1. Clothing. Take off your trousers in the water; knot each leg and button the fly. Grasp the waist band on one side and swing the trousers over your head from back to front so that the waist opening is brought down hard on the surface of the water. Air is trapped in each leg. If noise is no problem, hold the trousers in front of you and jump into the water. Either of these methods provides a serviceable pair of water wings.

2. Empty tins, gas cans, and boxes. Lash together as a buoyant, but use only when crossing slow moving water.

3. Logs or planks. Before deciding to use a wooden floating aid, test its ability to float. This is especially important in the tropics because most tropical trees, particularly the palm, sink even when the wood is dead.

(3) *Rafts.*

(*a*) Rafting rivers is one of the oldest forms of travel and often is the safest and quickest method of crossing a water obstacle; however, building a raft under survival conditions is tiring and time-consuming unless you have proper equipment and help. With these two requirements, rafts can be made from dry standing trees, bamboo, or brush.

(*b*) Spruce trees that are found in polar and sub-polar regions make the best rafts. A raft can be

constructed without spikes or rope if you have an axe and a knife. Consider a suitable raft for three men to be 12 feet long and 6 feet wide.

1. Build the raft on two skid logs placed so they slope downward to the bank. Smooth the logs with an axe so the raft logs lie evenly on them.

2. Cut four offset inverted notches, one in the top and bottom of both ends of each log (fig. 2–7). Make the notches broader at the base than at the outer edge of the log.

3. To bind the raft together, drive through each notch a three-sided wooden crosspiece about a foot longer than the width of the raft. Connect all the notches on one side of the raft before connecting those on the other.

4. Lash the overhanging ends of the two crosspieces together at each end of the raft to give it additional strength. When the raft enters the water, the crosspieces swell, binding the logs together tightly.

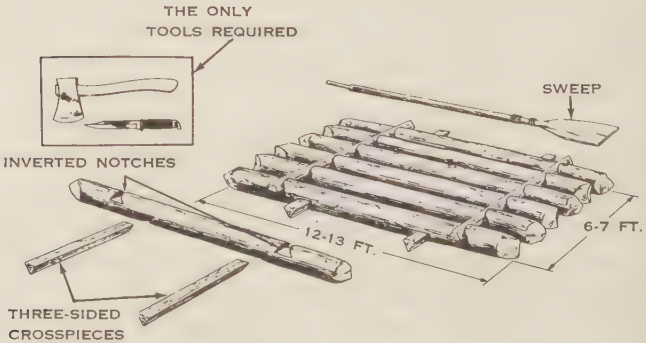


Figure 2–7. Constructing a log raft.

5. If the crosspieces fit too loosely, wedge them with thin pieces of dried wood. These swell when wet, tightening and strengthening the crosspieces.

6. Even with an axe, this type of woodwork requires a great deal of time and skill. A simple and more rapid method is the use of "pressure bars" lashed securely at each end to hold your logs together (fig. 2–8).

(*c*) Bamboo is light, tough, and cuts easily. It makes a serviceable raft.

(*d*) With a tarpaulin, shelter half, or other waterproof material, you can build an excellent raft using brush as a frame (see FM 5–13).

(*e*) In northern regions during the winter, rivers may be open in the middle part because of the swift current. Cross such a river on an ice block raft which can be cut off from the frozen shore ice, using an axe or even sometimes a pole (if there is a crack in the ice). The size of the raft should be about 2×3 meters, and the ice should be at least one foot

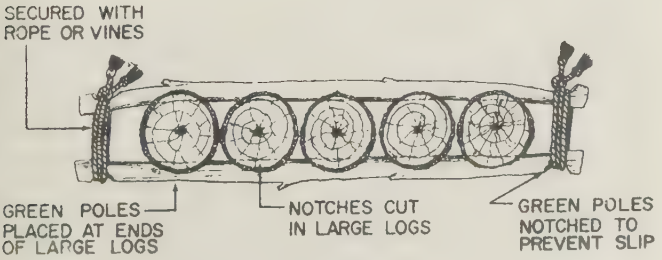

SECURED WITH ROPE OR VINES
GREEN POLES PLACED AT ENDS OF LARGE LOGS
NOTCHES CUT IN LARGE LOGS
GREEN POLES NOTCHED TO PREVENT SLIP

Figure 2–8. Use of pressure bars.

thick. A pole is used to move the ice block raft across the open part of the river.

c. Rapids or Swift Water.

(1) Swimming in rapids or swift water is not as great a problem as might be expected. In shallow rapids, get on your back with your feet pointing downstream; keep your body horizontal and your hands alongside your hips. Use the hands much like a seal moves his flippers. In deep rapids, swim on your stomach and aim for shore when possible. Watch for currents that converge; you might be sucked under because of the swirls they produce.

(2) A raft crossing of a deep and swift river may be accomplished by utilizing a pendulum action at a bend in the river (fig. 2–9). This method is useful when several men have to cross; however, the following procedures must be considered:

(*a*) The raft must be canted to the direction of the current.

(*b*) The rope from the anchor point must be 7–8 times as long as the width of the river.

(*c*) The attachment of the rope to the raft must be adjustable to change cant of raft to allow return to the starting bank.

d. Surf. Breaking waves become higher and shorter as they move shoreward. The side facing the shore curves and forms a breaker, actually moving the water toward the shore. Large waves break farther away from the shore than do smaller ones.

(1) In moderate surf, swim forward with the small waves; the crests raise the body. Dive when your ride on the crest ends and just before the wave breaks.

Figure 2–9. Crossing a river by pendulum action.

(2) In heavy surf, swim toward the shore while between the waves in a trough. As another wave comes forward, face it, dive, then turn and swim toward the shore after it passes.

(3) The backwash of incoming waves can be dangerous if the waves are large. If caught in this outbound current, do not try to swim against it. Swim with it. If carried under, push upward from the surface and ride toward shore on the next incoming wave.

e. Quicksand. Bogs. Quagmire. These obstacles are found most frequently in tropicial or semitropical swamps. Pools of muck are devoid of any visible vegetation and usually will not support even the weight of a rock. If you cannot detour such an obstacle, attempt to bridge it using logs, branches, or foliage. If none are available, cross it by falling face downward with the arms spread. Start swimming or pulling your way through, keeping the body horizontal. Use the same method for crossing quicksand.

2–15. Signaling While Traveling

There is always a chance of being rescued, but one man, or a group, is not easy to spot from the air, especially when visibility is limited. Therefore, be prepared to make your where-abouts and needs known to rescuers.

a. Tramp out letters in the snow or use branches to spell a message. If on sand, use boulders or seaweed. Select material whose color contrasts with the surface used. Use the signal code illustrated in figure 2–10.

b. Produce smoke by making a large fire and piling enough damp vegetation on it to smother it.

c. Signal by waving your undershirt, shorts, or trousers or by spreading them against a contrasting background.

d. Flash a beam of light from a mirror or other shiny material. Improvise a mirror from a ration tin or belt buckle. Punch a crosshole in the center of the reflector. Reflect sunlight from the mirror to a nearby surface, slowly bring it to eye level, and look

1 REQUIRE DOCTOR, SERIOUS INJURIES	
2 REQUIRE MEDICAL SUPPLIES	
3 UNABLE TO PROCEED	
4 REQUIRE FOOD AND WATER	
5 REQUIRE FIREARMS AND AMMUNITION	
6 REQUIRE MAP AND COMPASS	
7 REQUIRE SIGNAL LAMP WITH BATTERY AND RADIO	
8 INDICATE DIRECTION TO PROCEED	
9 AM PROCEEDING IN THIS DIRECTION	
10 WILL ATTEMPT TAKEOFF	
11 AIRCRAFT SERIOUSLY DAMAGED	
12 PROBABLY SAFE TO LAND HERE	
13 REQUIRE FUEL AND OIL	
14 ALL WELL	
15 NO	
16 YES	
17 NOT UNDERSTOOD	
18 REQUIRE ENGINEER	

NOTE: A SPACE OF 10 FEET BETWEEN ELEMENTS, WHENEVER POSSIBLE

Figure 2–10. Ground air emergency code.

through the sighting hole. A bright spot of light can be seen on the target. Continue sweeping the horizon even though no ships or planes are sighted. Mirror flashes can be seen for miles even on hazy days.

e. Use a spruce torch for night signaling. Select a tree with dense foliage. Place dry timber in the lower branches to light the tree. Remember that the enemy may be attracted by this light. Also, insure that the fire is not likely to get out of control and endanger your safety.

Section III. HEALTH AND HYGIENE

2–16. Aids to Maintaining Health

Protection against disease and injury involves making habits of many simple practices which is called personal hygiene. Immunizations will help protect against a few of the more serious diseases to which one might be exposed—smallpox, typhoid fever, tetanus (lockjaw), typhus, diphtheria, cholera, plague, and yellow fever. They will not protect against the much more common diseases like diarrhea, dysentery, colds, and malaria. The only means of preventing these is keeping physically fit and keeping disease germs out of your body. Applying the following rules will go a long way toward keeping you on your feet.

a. Keep Clean.

(1) Body cleanliness is the first defense against disease germs. A daily shower with hot water and soap is ideal. If this is impossible, keep the hands as clean as possible, clean under the fingernails, sponge

the face, armpits, crotch, and feet at least once a day.

(2) Keep clothing, especially underclothing and socks, as clean and dry as possible. If laundering is impossible, shake out clothing and expose to sun and air daily.

(3) When available, use a toothbrush regularly. Soap or table salt and soda make good substitutes for toothpaste, and a small green twig, chewed to a pulpy consistency at one end, will serve as a toothbrush. Rubbing with a clean finger is another method. This method also massages the gums. After eating, rinse your mouth if potable water is available.

b. Guard Against Intestinal Sickness.

(1) Common diarrhea, food poisoning, and other intestinal diseases are the most common and often the most serious diseases to guard against. They are caused by eating or drinking contaminated food, water, or other beverages. To guard against these diseases—

(*a*) Keep the body, particularly the hands, clean. Keep the fingers out of the mouth. Avoid handling food with the hands.

(*b*) Insure the potability of drinking water by the use of water treatment tablets or by boiling for 1 minute.

(*c*) Wash and peel all fruit.

(*d*) Do not keep food for long periods following preparation.

(*e*) Sterilize eating utensils preferably by boiling in water.

(*f*) Keep flies and other vermin off your food and drink. Keep the camp clean.

(*g*) Adopt strict measures for disposing of human waste and garbage.

(2) If vomiting or diarrhea occurs, rest and stop eating solid food until the symptoms ease. Take fluids, particularly potable water, in small amounts at frequent intervals. As soon as can be tolerated, resume eating semi-solid food. Normal salt intake should be maintained.

c. Guard Against Heat Injury. In hot climates, develop a tan by gradual exposure to the sun. Strenuous exertion in the hot sun may cause a heat stroke. The lesser illnesses caused by heat can be prevented by consuming enough potable liquids and salt to replace losses through perspiration (FM 21–11). Avoid overeating as this may also induce heat injury.

d. Guard Against Cold Injury.

(1) When exposed to severe cold, conserve body heat by every possible means. Take particular care of the feet, hands, and exposed parts. Keep socks dry and use any available material including rags, paper, moss, grass, and leaves to improvise protective covering.

(2) Frostbite is a constant danger to anyone exposed to temperatures below freezing. Treatment of frostbite consists of getting the patient into a warm place (normal room temperature) as soon as possible and rapidly rewarming frozen parts of the body by immersion in warm water (90° F–104° F), by placing a warm hand on the frozen part, or by exposure to warm air. *Do not massage* or apply snow or ice to the affected area (FM 21–11).

e. Take Care of Your Feet.

(1) Dirty or sweaty socks will cause foot deterioration. If an extra clean pair is not available, wash out those that you are wearing. If you have an extra pair, put the washed pair inside the shirt next to the body. They should dry in a short time. If possible, wear woolen socks; they absorb perspiration. Socks may be frozen and then beaten to remove dirt, perspiration, salts, and moisture.

(2) Blisters are dangerous because they may become infected. Such infections may preclude travel and may, if they become severe, result in death. If your shoes fit well and you dry them after crossing wet ground, change your socks frequently, use foot powder, and massage or gently rub your feet, you should have little trouble with blisters. Should a blister develop, do not puncture it. Place padding on the area to reduce pressure and chafing.

Section IV. HAZARDS

2–17. Biological Hazards

a. Disease may be the worst enemy in your struggle for survival. Although it is not necessary to know a great deal about diseases, you should know about their presence in certain areas, how they are transmitted, and how to prevent them.

b. Most diseases are caused or transmitted by parasitic plant and animal organisms such as ticks and mites that enter the body, multiply, and set up a series of disturbances. If knowledgeable of the carriers responsible for a particular disease, you are better able to avoid contacting the disease by keeping the transmitting agents away from your body.

2–18. Smaller Forms of Life

a. Do Not Be Fooled. Forms of life such as insects can be more dangerous and uncomfortable than even a scarcity of food and water; however, their greatest danger is in their ability to transmit weakening and often fatal diseases through their bites.

(1) Disease-transmitting agents require certain environmental conditions to exist and multiply, such as proper amount of sunlight, ideal temperatures, and suitable breeding sites. Because of these factors, you have only a limited number of disease-transmitting agents to guard against at any one place or time.

(2) Frequently, the particular disease organisms which are transmitted to man must, at some time in the course of the transmitting agent's life, pass through one or more specific hosts. If the hosts are absent, the disease organism does not exist in the area and cannot be transmitted regardless of how many potential transmitting agents are present. Man is a specific host in the case of malaria.

b. Mosquitoes and Malaria. Mosquito bites are not only unpleasant; they can lead to death. Mosquitoes are found throughout the world. In some areas of the Arctic and temperate regions during the late spring and early summer, they are more numerous than at any time in the tropics. Tropical mosquitoes, however, are much more dangerous because they transmit malaria, yellow fever, dengue fever, encephalitis, and filariasis.

c. Take Every Precaution Against Mosquito Bites. Follow these rules:

(1) Camp on high ground away from swamps.

(2) Sleep under mosquito netting if available. Otherwise, use any available material.

(3) Smear mud on your face, especially before going to bed.

(4) Wear all clothing, especially at night.

(5) Tuck the pants into the tops of your socks or shoes.

(6) Wear a mosquito headnet and gloves.

(7) Use mosquito repellent. When applied to clothing, mosquito repellent will remain effective for weeks. On the skin it is absorbed in a few hours.

(8) Take antimalaria tablets, according to directions, as long as your supply lasts.

(9) Smoke, as a last resort, can be used to reduce exposure to mosquitoes.

d. Flies. Like mosquitoes, flies vary in size, breeding habits, and in the discomfort or danger they can cause. The protection used against mosquitoes generally is effective against flies.

e. Fleas. These small wingless insects can be extremely dangerous in some areas because they can transmit plague to man after feeding on plague-ridden rodents. If you use a rodent as food in suspected plague areas, hang up the animal as soon as it is killed and do not handle it until it becomes cold. Fleas will leave a cold body. To protect yourself against fleas, use repellent powder and wear tight fitting leggings or boots.

f. Ticks. These flat oval pests are distributed throughout the world and are especially prevalent in the tropics and sub-tropics. They are carriers of tick relapsing fever and tick typhus. The two types

of ticks are the hard or wood tick, and the soft tick.

g. Mites, Chiggers, and Lice. These very small insects are common in many areas of the world, and their ability to irritate is entirely out of proportion to their size. Chiggers are immature stages of certain mites which bore into the skin and cause itching and discomfort. People particularly susceptible to these bites may become ill. In some parts of the world, chiggers transmit scrub typhus. The human itch mite may cause various skin diseases such as scabies or Norwegian itch. Secondary infection as a result of scratching may result. Native villages usually are infested with lice. Try to avoid huts and personal contact with the natives. If bitten by a louse, try not to scratch, because you will spread the louse feces into the bite. It is through infection with louse feces that man contracts such diseases as epidemic typhus and louseborne relapsing fever. If you do not have any louse powder, boiling your clothing will rid it of lice. If this is not possible, expose the body and clothes, particularly clothing seams, to direct sunlight for a few hours to remove the lice. After exposure to these insects, wash yourself, preferably with soap. If soap is not available, the sediment or sand from stream bottoms is an acceptable substitute. Frequently inspect the hairy portions of the body for lice.

h. Spiders. Except for the black widow or hour glass, and the brown or recluse, spiders in general are not particularly dangerous. Even the tarantula is not known to bite with fatal or even serious effects. The black widow, however, along with tropical members of the same family, should be avoided as

their bites cause severe pain, swelling, and even death. All of these spiders are dark and marked with white, yellow, or red spots. Acute abdominal cramps may follow the bite of one of these spiders and may continue intermittently for a day or two. It is possible to mistake the pain for acute indigestion or even appendicitis.

i. Scorpions. The sting of this usually small animal is painful but seldom fatal. Some of the larger species, however, are more dangerous and their sting may result in death. Scorpions are found in widely separated areas and may constitute a real danger, since they hide in clothing, shoes, or bedding. Shake out your clothes before putting them on. If stung, use cold compresses or mud. In the tropics, apply coconut meat locally (fig. 2–11).

j. Centipedes and Caterpillars. Centipedes are numerous in the tropics, and some of the larger species can inflict painful bites. They seldom bite man, however, except when they cannot escape. Like the scorpion, they are not dangerous except when they have taken shelter in an article of clothing that is about to be worn (fig. 2–12). Centipedes and caterpillars sometimes cause severe itching and inflammation when brushed against. Caterpillars can also cause painful blisters. Additionally, death in extremely weak adults has been attributed to almost simultaneous contact with several of the so called "electric caterpillars" found in Central and South America.

k. Bees, Wasps, and Hornets. The stings of an aroused swarm of bees, wasps, or hornets may be dangerous, even fatal. Avoid nests, but if you are

attacked, plunge through some dense brush or undergrowth. The twigs, springing back into position will beat off the insects.

l. Leeches. These blood-sucking animals are found in widely separated areas of Borneo, the Philippines, Australia, the South Pacific, and various parts of South America. They cling to blades of grass, leaves,

Figure 2–11. Scorpion.

and twigs and fasten themselves to passing individuals. Bites cause discomfort, loss of blood, and may be followed by infection. Remove leeches by touching them with a lighted cigarette, match, moist tobacco, or by using insect repellent.

m. Flukes or Flatworms. These parasites are found in sluggish fresh water in parts of tropical America, Africa, Asia, Japan, Formosa, the Philippines, and other Pacific islands. There is no danger of flukes in salt water. Flukes penetrate the skin of those who come in contact with them either by drinking or bathing in infested waters. They feed

CATERPILLAR

CENTIPEDE

Figure 2–12. Centipedes and caterpillars.

on blood cells and their eggs escape through the bladder or intestine. Proper wearing of the uniform will help avoid exposure.

n. Hookworm. Common in the tropics and subtropics, the hookworm larvae enters through bare feet or any other exposed skin that is in contact with the ground. There is no danger from hookworms in wilderness areas away from human habitation.

2–19. Poisonous Snakes and Lizards

a. Facts Outweigh Fiction. Fear of snakes is common among men, but comes more from improper training than experience. Actually, only a small proportion of all snakes in the world are poisonous (app. C). A variety of poisonous snakes exists in the tropics, but the danger from these snakes is less than in rattlesnake or moccasin-infested areas of the United States. Some areas of the world are free of poisonous land snakes, including New Zealand, Cuba, Haiti, Jamaica, Puerto Rico, and the Polynesian Islands.

b. Be on Your Guard. Some snakes are more aggressive than others and may attack man without apparent provocation. But aggressiveness is the exception.

(1) Snakes cannot tolerate weather extremes. In temperate regions, they are active day and night during the warmer months; they hibernate or become inactive in cold weather. In desert and semidesert regions, snakes are most active during early morning and seek shade during the day. Many snakes are active only at night.

(2) Snakes normally are slow travelers, but can

strike with astonishing rapidity. They cannot outrun a man, and only a few can leap clear of the ground.

c. Poisonous Long-Fanged Snakes. Among the group of very venomous snakes are the vipers and adders of Europe, Asia, and Africa; the rattlesnakes, copperheads, and cottonmouth moccasins of North America; the bushmaster, fer-de-lances, and several other species of tropical America.

(1) The true vipers and pit vipers are mostly thick-bodied with flattened heads. Well known species of the true vipers, found only in the old world, are Russell's viper of India; the Cape viper of southern Africa; and the puff adder of dry areas of Africa and Arabia; and the gaboon viper of tropical Africa.

(2) The bite of a snake belonging to this group is very painful and is followed by local swelling which increases as the venom spreads throughout the tissue.

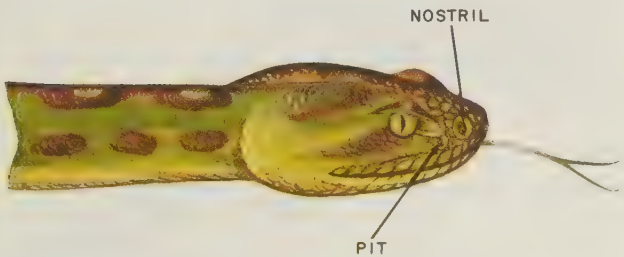


Figure 2–13. Identifying a pit viper.

d. Poisonous Short-fanged Snakes. Because of the relatively short fangs of snakes belonging to this group, even light clothing reduces their danger to man. Their venom is the most deadly among poisonous snakes. Snakes included in this short-fanged group are the cobras, kraits, and coral snakes. They comprise the majority of snakes in Australia, and many species are found in India, Malaya, Africa, and New Guinea.

(1) There are 10 or more species of cobras, all found in Africa and Asia (fig. C–1 and C–8). All are more or less able to form a "hood." The king cobra is the largest of poisonous snakes.

(2) The venom of the cobra and its relatives chiefly affects the nerves, and the cobra bite is not painful until some time later. Since the venom is promptly absorbed into the victim's bloodstream, it is distributed rapidly to all parts of the body.

(3) Many sea snakes belong to this group.

e. Sea Snakes. Venomous sea snakes are not found in the Atlantic, but occur in large numbers off the shores of the Indian Ocean and the southern and western Pacific. Usually they are encountered in tidal rivers and near the coast but may be seen far out at sea. Usually they do not disturb swimmers, so there is little danger of being bitten. They are identified by their flat, vertically compressed paddle tail.

f. Boas and Pythons. Boas and pythons are slow moving and timid and rarely attack man unless molested. They then are vicious and dangerous because of their sharp teeth and power of constriction. The

large species live only in dense jungle areas of the Philippines, southern India, China, South America, central and south Africa, and southeast Asia.

g. Lizards. No lizards found anywhere in the world are poisonous except the gila monster (fig. 2–14) and the beaded lizard which are found only in the American southwest and Central America and Mexico. Because of the sluggishness of these lizards, they constitute little danger. Both are found only in desert areas.

h. First Aid for Snake Bites. Take no chance and treat all snake bites as poisonous. Follow these steps:

(1) Remain calm, but act swiftly.

(2) Within practical limits, immobilize the affected part in a position below the level of the heart.

(3) Place an improvised, lightly constricting band (tourniquet) two to four inches closer to the heart than the site of the bite and reapply the con-

Figure 2–14. Gila monster.

stricting band ahead of the swelling if it progresses up the arm or leg. The constricting band should be placed tightly enough to halt the flow of blood in surface blood vessles, but not tightly enough to stop the pulse (arterial flow).

(4) If accomplished within one hour, make a single cut over each fang mark. The cuts must not be more than one-half inch long and one-fourth inch deep and should be made through the skin parallel to the bitten part.

(5) Apply suction to the wound. If a snakebite kit is available, use its suction pump. If none is available, apply suction by mouth, spitting out the blood and other fluids frequently. Snakebite poison is not harmful in the mouth unless there are cuts or sores in the mouth. Even so, the risk is not great. Suction should be kept up for at least 15 minutes before loosening the tourniquet.

(6) If after 15 minutes you feel no intense dryness and tightness of the mouth, headaches, pain or swelling of the bitten area, the bite is non-poisonous.

(7) If poisonous, continue treatment as stated in (5) above.

2–20. Poisonous and Dangerous Water Animals

a. Sharks. These large aquatic predators are curious and will investigate objects in the water. It is unlikely they will attack unprovoked, but are likely to attack a wounded and bleeding swimmer. Any flow of blood should be stopped as quickly possible. If in shark-infested water, swim as quietly as possible.

(1) Sharks live in almost all oceans, seas, and in river mouths. Records show, however, that most shark attacks have occurred on waters with temperatures ranging from 65°F. upward. There is no shark problem in areas of colder water.

(2) Actually, the chances of being attacked by a shark are very small. Even in warm oceans where attacks are possible, the risk can be reduced by knowing what to do and how to do it and by the use of shark repellent.

b. Protective Measures Against Sharks.

(1) *In the water.*

(*a*) Keep a sharp lookout for sharks.

(*b*) Keep clothing and shoes on.

(*c*) If in a group threatened or attacked by a shark, bunch together and form a tight circle. Face outward so you can see an approaching shark. If the sea is rough, tie yourselves together. Ward off attack by kicking or stiff-arming the shark.

(*d*) Stay as quiet as possible. Float to save energy. If you have to swim, use strong regular strokes; do not make frantic irregular movements.

(*e*) When swimming alone, stay away from schools of fish.

(*f*) If a single shark threatens at close range—

1. Use strong regular swimming movements; try feinting toward the shark—it may be scared away.

2. Do not swim away directly in the shark's path; face the shark and swim quickly to one side.

3. Make loud sounds by slapping the sur-

face of the water with cupped hands; use regular strokes.

4. At close quarters in a showdown, use a knife to stab the shark on the snout, eyes, gills, or belly.

5. As a last resort, kick or stiff-arm a shark to push it away, or grasp a side fin and swim with the shark until you can veer away from it.

(2) *On a raft.*

(*a*) Do not fish from the raft when sharks are nearby. Abandon hooked fish if shark approaches. Do not clean fish over the water when sharks are sighted.

(*b*) Do not throw waste overboard if sharks are around.

(*c*) Do not dangle hands or feet in water, especially when fishing.

(*d*) If a shark threatens to attack or to damage the raft, discourage it by jabbing snout or gills with the oar (being careful not to break the oar).

(*e*) Fire a pistol above the shark—the noise may frighten it away.

(*f*) Look for sharks around and under raft before going into water or landing.

c. Rays. Giant rays or mantas, which are found in tropical waters, may be mistaken for sharks. A swimming ray curls up the tips of its fins; and when seen from water level, the fins somewhat resemble the fins on the backs of two sharks swimming side by side. Closer observation will show that the animal is a ray and not two sharks; if both the fins disappear together periodically, it is a ray. In deep water, all rays are harmless to swimmers; however,

some are dangerous if stepped on in shallow water (fig. 2–15).

d. Barracudas. The barracuda is found in most

GIANT RAY OR MANTA

Figure 2–15. Ray.

tropical and subtropical seas along reefs in murky water. It is considered by some to be more dangerous than a shark. The barracuda attacks indiscriminately (fig. 2–16).

e. Electric Ray. Found both in open water and along sandy and muddy bottoms, the electric ray, or torpedo, can give paralyzing shock. The torpedo, however, is rarely encountered.

Figure 2–16. Barracuda.

f. Jellyfish. The jellyfish, including the Portuguese man-of-war, is characterized by its ability to sting. The greatest danger may develop from contact with the tentacles. Clothing affords some protection from these animals.

g. Sting Rays. The sting ray has a poisonous barbed spine. This spine is consequently hard to remove and has a tendency to break off in the wound, increasing the probability of infection. These animals are flat, skatelike fish, often several feet in length. They are found in shallow, warm, coastal waters. Waders may clear a path in the water by poking a stick as they advance. The sting of a large ray can be fatal.

h. Scorpion, Toad, and Stone Fish. The stone and scorpion fish of the Pacific Ocean and some of the toadfish of tropical America are the most dangerous poisonous fish. They have stinging spines and may be encountered among coral. Treat a sting as you would a snake bite (fig. 2–17).

i. Other Water Hazards. Dangerous water animals listed above by no means exhaust the list of hazards that may be encountered. Tropical boneshell and long, slender, pointed terebra snails are also poisonous. Handle big conchs with caution; large abalones and clams can be dangerous if gathered by hand instead of pried loose with a bar or wedge. They may clamp onto your fingers and hold you under until you drown. Coral, dead or alive, can inflict painful cuts; seemingly harmless sponges and sea urchins can slip fine needles of lime or silica into the skin, which will break off and fester.

(1) Piranha are small fish that live in the

Amazon River and its tributaries in South America. They are attracted even by the most minute amount of blood in the water. You can cross a piranha infested stream with reasonable safety by throwing the bleeding carcass of an animal into the stream

Figure 2–17. Toadfish.

and then crossing "upstream". This techique should be used only in an emergency.

(2) Crocodiles and alligators are found in widely separated areas of the world. Alligators are found only in the southern United States and along the Yangtze River in China; crocodiles are found in coastal swamps, inlets, and tidal rivers of the south Pacific, and in some areas of Africa and Madagascar. The American crocodile, found along coastal regions of Mexico, the West Indies, Central America, Colombia, and Venezuela, usually will avoid man. The crocodile is considered more vicious and treacherous than the alligator, but generally is not dangerous when left alone.

2–21. Danger from Mammals

a. Most stories about the dangers from larger animals are fiction, but very few animals will refuse to fight if forced into a corner. Many animals are dangerous when wounded or when they are protecting their young. Old exiles or hermits such as elephants, boars, or buffaloes that have been cast off by the herd are often cantankerous and belligerent. Lions, tigers, and leopards that are too old to successfully hunt other animals may become maneaters. Such animals, however, are rare.

b. In arctic and subarctic regions, bears are surly and dangerous. If you hunt them, do not shoot unless you are sure to kill. The polar bear rarely comes on land but is attracted by the smell of food caches or animal carcasses. It is a tireless, clever hunter and should be treated with great caution. The walrus too, is a dangerous animal at close quarters.

c. Avoid wild buffaloes because of their continued mean tempers. Approach wild pigs with caution. Elephants, tigers, and other large animals avoid man if given a chance, but they may charge when startled.

d. Bites from all canines (dogs, jackals, foxes) as well as some other meat eaters may cause rabies. Blood sucking vampire bats are not dangerous unless they are rabid or their bite becomes infected.

2–22. Poisonous Plants

a. Just Like Home. The danger from poisonous plants in other regions of the world is no worse than in parts of the United States. As a rule, poisonous plants are not a serious hazard; but under certain conditions, they can be dangerous. The two general types of poisonous plants are those poisonous to touch and those poisonous to eat.

b. Plants Poisonous to Touch. Most of the plants poisonous to touch belong to either the sumac or the spurge families. The three most important poisonous plants in the United States are poison ivy (fig. 2–18), poison oak (fig. 2–19), and poison sumac (fig. 2–20). All of these plants have compounded leaves and small, round, grayish-green or white fruits. Knowledge of the appearance and effects of these plants will help you in other parts of the world where similar plants flourish. A good field treatment for these poisonous plants is to apply wet wood ashes to the affected area of the body.

(1) Symptoms of plant poisoning are similar in all parts of the world—reddening, itching, swelling, and blisters. The best treatment after contact

with these plants is a thorough washing using a strong soap.

(2) There are many different kinds of plants in the tropics and subtropics that are poisonous to touch. Plants more frequently encountered are—

Figure 2–18. Poison ivy.

(*a*) The black poison wood of Central America.

(*b*) Carrasco, a shrub of the West Indies.

(*c*) The Rengas trees of Malaya, the Philippines, and South Pacific Islands.

Figure 2–19. Poison oak.

(*d*) The lacquer tree of China and Japan.

(*e*) Certain species of the Asian mangifera.

(*f*) The "blind eye," white mangrove found in Australia, India, and the South Pacific Islands.

Figure 2–20. Poison sumac.

(*g*) The milky juices of such plants as the castor oil or castor bean plant, and the sap of the papaya tree.

c. Plants Poisonous to Eat. The number of poisonous plants is not great in comparison to the number that is nonpoisonous and edible. A good rule is to learn the plants that are edible and, if necessary, eat strange plants in minute quantities and wait a while before continuing.

(1) In arctic and subarctic regions, you may assume that less than a dozen plants are poisonous. Two of the most poisonous plants of the far north are water hemlock and poisonous mushrooms.

(2) Poisonous plants are encountered in the tropics in no greater proportion than in the United States. If in doubt about which plants are poisonous and not poisonous, observe birds, rodents, monkeys, bears, and various other vegetable-eating animals. Usually the food these animals eat is safe for humans. Use these hints as a guide:

(*a*) Avoid eating plants that taste bitter.

(*b*) Cook all plant food when in doubt. Many plant poisons are removed by cooking.

(*c*) Avoid eating plants with milky juice, and do not let milky juice contact your skin. This rule does not apply to the numerous wild figs, breadfruit, papaya, and barrel cactus.

(*d*) Avoid ergot poisoning from infected heads of cereals or grasses by discarding grain heads having black spurs in place of normal seed grains.

d. Plants With Stinging Hairs. Plants with stinging hairs generally do not constitute a real danger.

Their sting, however, due to formic acid, is painful. Contact with stinging nettles found in wastelands of the United States and Europe will give you an example of what to expect from this type plant in other areas of the world.

2–23. Radioactive Areas

a. Nuclear conflict may challenge your ability to take effective countermeasures against residual radiation which may become your immediate and most pressing mission.

b. Residual radiation hazard may be subdivided into two categories—

(1) *Internal*, which poses the problem of decontaminating your body, food, and water.

(2) *External*, which makes it imperative to obtain immediate shelter. The intensity of residual radiation is greatest during the first 48 hours. At the end of this period, the extent of radioactivity will be reduced a hundredfold, enabling you to leave the shelter in search of food and water. At the end of two weeks, the radiation level will decrease a thousand times.

c. In summary, your "survival mission" under nuclear conditions will be—

(1) Seek immediate shelter to reduce intensity and amount of exposure.

(2) Attempt to increase distance from the source of radiation after the initial 48-hour period has elapsed.

(3) Decontaminate your body, food, and water.

d. See FM 21–41 for further coverage of radiation effects on your body, food, and water.

CHAPTER 3

FOOD AND WATER

Section I. GENERAL

3–1. You Need Not Starve

a. It takes little reasoning to recognize that after water, man's most urgent requirement is food. This is especially true during a survival episode when every ounce of energy and endurance is needed.

b. Men have survived for more than a month without food, but unless you are in extreme circumstances, there is little need to be deprived of something to eat. Nature can be a provider if used properly. Apply the following rules when isolated:

(1) Inventory rations and water. Estimate the length of time you will be on your own.

(2) Divide food—two-thirds for the first half of isolation and one-third for the second half.

(3) Avoid dry, starchy, and highly seasoned food and meat if you have less than one quart of water for each day. Remember—eating makes you thirsty. Eat food high in carbohydrates—hard candy, fruit bars.

(4) Keep work to a minimum. The less work, the less food and water required.

(5) Eat regularly if possible; do not nibble.

Plan one good meal each day and cook it if you can. Cooking makes food safer, more disgestible, and more palatable. Also, the time spent cooking will afford a rest period.

(6) Always be on the lookout for wild food. With few exceptions, everything that grows from the soil, or walks, crawls, and swims is a potential food source. Learn to live off the land.

(7) *Chew all food many times more than normal* for better nutrition and disgestion.

3–2. Your Greatest Need

a. Without water the chances of living are nil, and all the food in the area means nothing. This is especially true in hot climates where you perspire heavily. Even in cold weather the body needs at least two quarts of water each day; any lesser amount reduces efficiency.

b. Learn to use water intelligently. Where water is scarce, drink infrequently, but drink your fill. Do not drink urine—the waste material causes illness. Purify or boil all water, if at all possible. Take salt tablets with plenty of water to preserve body strength and resistance during periods of hot weather.

Section II. VEGETABLE FOODS

3–3. General

a. Experts estimate that about 300,000 classified plants grow on the earth's surface, including many which grow on mountain tops and ocean floors. Of these, 120,000 varieties are edible. Obviously, it is

not possible to learn about all of these plants from reading this manual. If you are stranded, can identify the plant, and know how to prepare it properly, you should derive enough food substance to keep you alive.

b. For study purposes and future use, this manual gives descriptions and pictures of certain edible plants that can be eaten. Become familiar with these "pilot plants"; they will enable you to evaluate the food possibilities of other plants of the same variety.

c. Do not limit your study to the illustrations and descriptions of plant food in this manual. Take every opportunity to see these plants in their natural habitat; then, if forced into a survival situation in any area of the world, you will know where the best plant food of a region is.

d. Many of the edible plants in this manual appear throughout the world. Blackberries and raspberries grow in the Philippines and Siberia as they do in America; cultivated potatoes, peas, and beans are found in Germany as well as in Canada; and persimmons thrive on Guam as they do in Georgia.

e. Plant food will sustain you, although it may not provide a balanced diet, even in the arctic where the heat producing qualities of meat are normally essential. Many plant foods like nuts and seeds will give enough protein for normal efficiency. Suitable plants provide calorie-giving carbohydrates.

3–4. Wild Plant Food

It is generally safe to try wild plant food you see being eaten by birds and animals; however, you will find few plants of which every part is edible. Many

have one or more identifiable parts that have considerable food or thirst-quenching value. For a discussion of some plant parts that contain food value, see appendix B.

3-5. Cultivated Vegetables

Harvested vegetable or grain fields are rich sources of food. Look for old potato, corn, and turnip fields and harvested pea patches in Europe and the temperate countries of Asia.

a. If you discover a potato field, dig into the hills for potatoes that were overlooked when the field was harvested. Eat the potatoes raw or cooked, after first cleaning or peeling them.

b. Look for fields with vegetable stalks that remain in the ground after harvest. These include turnips, rutabagas, carrots, beets, and radishes. Any of these can be eaten cooked or raw; however, peel or clean these foods before eating to eliminate the dangers caused by contamination from fertilizers.

c. In abandoned corn fields, search the ground for discarded ears. Eat kernels raw, cooked, or parched as pinole. Pinole is a highly nutritious food made by parching corn in hot ashes or over a fire and grinding it into flour. A handful of this in water makes a nutritious and tasty combination.

Section III. ANIMAL FOODS

3–6. Varieties

a. Many people consider grasshoppers, hairless caterpillars, wood-boring beetle larvae and pupae, spider bodies, and termites as delicacies. You have

probably eaten some of them unknowingly in your daily food. The time may come when no choice is available but to eat insects such as these. If so, they are much more palatable if cooked until dry, or disguised in a stew.

b. Foods derived from animals have much more food value per pound than those derived from plants, but are more difficult to obtain. A knowledge of edible animals, including where to look for them and how to catch them, increases survival chances.

3–7. Foods From Fresh Water

Fresh water lakes, ponds, streams, and rivers are abundant food reservoirs. Look for them; they support more animal life in a smaller area than the land, and often the food they harbor is easier to acquire. Count on finding such water animals as fish, frogs, snails, and crabs around or in most inland waters.

a. Fish. Of the animal life around or in fresh water, fish are probably the most difficult to catch. It may take hours or even days to be successful. It can be done, even with crude equipment, if you are patient, and know where, when, and how to fish.

(1) *When to fish.* It is difficult to state the best time to fish because different species feed at different times, both day and night. As a general rule, look for fish to feed just before dawn and just after dusk; just before a storm as the front is moving in; and at night when the moon is full or waning. Rising fish and jumping minnows may also be signs of feeding fish.

(2) *Where to fish.* The place selected to start

fishing depends on the type of water and the time of day. In fast running streams in the heat of the day, try deep pools that lie below the riffles. Toward evening or in the early morning, float the bait over the riffle, aiming for submerged logs, undercut banks, and overhanging bushes. On lakes in the heat of the summer, fish deeply as fish seek the coolness of deeper water. In the evening or early morning in summer, fish the edges of the lake; the fish are more apt to feed in shallow water. Lake fishing in the spring and late fall is more productive on the edge in shallow water because fish are either bedding or seeking warmer water. With practice you can locate the beds of some species of fish by their strong, distinctively "fishy" odor.

(3) *Bait.*

(*a*) As a general rule, fish bite bait taken from their native water. Look in the water near the shores for crabs, fish eggs, and minnows and on the bank for worms and insects. If you catch a fish, inspect its stomach to see what it has been eating; then try to duplicate this food. Use its intestines and eyes for bait if other sources are unproductive. When using worms, cover the hook completely. With minnows, pass the hook through the body of the fish under its backbone in the rear of the dorsal fin. Be sure not to sever the minnow's backbone.

(*b*) Make artificial bait from pieces of brightly colored cloth, feathers, or bits of bright metal fashioned to duplicate insects, worms, and minnows. Strive to make artificial bait look natural by copying the actions of natural fish food.

(4) *Improvised fishing devices.* If you have no

hooks, improvise them out of insignia, pins, bone, or hardwood (fig. 3–1). By twisting bark or cloth fibers, a sturdy line can be fashioned. Using the inner bark of a tree, knot the ends of two strands and secure them to a solid base. Hold a strand in each hand and twist clockwise, crossing one above the other counterclockwise. Add fiber as necessary to

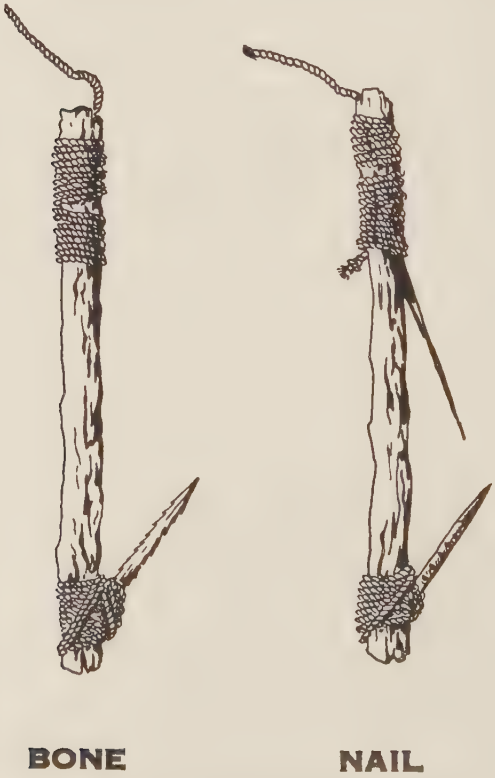


Figure 3–1. Improvised hooks and lines.

increase the length of the line. If parachute suspension lines are available, use these for your line. Small nails can be most effiective.

(5) *Catching fish.* There will be times when the most elaborate line and suitable bait will not yield a single fish. Do not become discouraged because there are other methods that may prove more productive.

(*a*) *Set lines.*

1. Set lines provide a practical method for catching fish if you remain for a period of time near a lake or stream. Tie several hooks onto a line. Bait them and fasten the line to a low-hanging branch that will bend when a fish is hooked. Keep this line in the water as long as you are in the area, checking it periodically to remove fish and rebait the hooks.

2. An excellent hook for a set line is the gorge or skewer hook (fig. 3–2). Sink the skewer into a chunk of bait. After the fish swallows the bait, the skewer swings crosswise and lodges in the stomach, securing the fish to the line.

(*b*) *Jigging.* This method requires an 8- to 10-foot limber cane or similar type pole, a hook, a piece of brilliant metal shaped like a commercial fishing spoon, a 2- to 3-inch strip of white meat or pork rind or fish intestine, and a piece of line about 10 inches long. Attach the hook just below the spoon on the end of the short line, and tie the line to the end of the pole. Working close to the edge near lily pads or weeds beds, dabble the hook and spoon apparatus just below the surface of the water. Occasionally slap the water with the tip of the pole to attract large fish to the bait. This method is especially effective at night.

(*c*) *Using your hand.* This method is effective in small streams with undercut banks or in shallow ponds left by receding flood waters. Place your hands in the water and allow them to reach water temperature. Reach under the bank slowly, keeping the hands close to the bottom if possible. Move the fingers slightly until you contact a fish. Then work your hand gently along its belly until you reach its gills. Grasp the fish firmly just behind the gills.

(*d*) *Muddying.* Small isolated pools caused by the receding waters of flooded streams are often

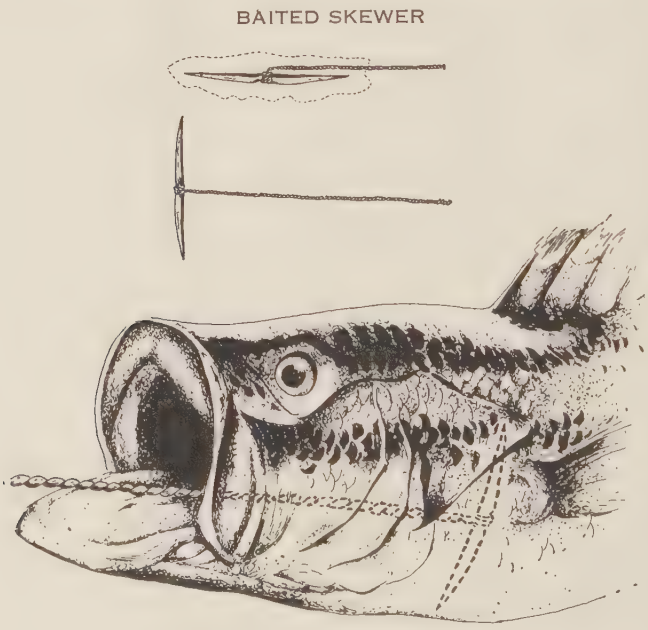


Figure 3–2. Skewer hook.

abundant in fish. Disturb the mud of the bottoms of these puddles by stamping in them or using a stick until the fish are forced to seek clearer water at the surface. Then throw them out of the water with your hands or club them.

(*e*) *Spearing.* This method is difficult except when the stream is small and the fish are large and numerous, during the spawning season, or when the fish congregate in pools. Tie a bayonet on the end of a pole; sharpen a piece of bamboo; lash two long thorns on a stick; or fashion a bone spear point, and position yourself on a rock over a fish run. Wait patiently and quietly for a fish to swim by.

(*f*) *Nets.* The edges and tributaries of lakes and streams usually are abundant with fish too small to hook or spear but large enough to net. Select a forked sapling and make a circular frame. Stitch or tie your undershirt, or tie the clothlike material found at the base of coconut trees to this frame, making sure the bottom is closed. Scoop upstream around rocks or in pools with this improvised net.

(*g*) *Traps.*

1. These are useful for catching both fresh and salt water fish, especially those that move in schools. In lakes or large streams, fish approach the banks and shallows in the morning and evening. Sea fish traveling in large schools regularly approach the shore with the incoming tide, often moving parallel to the shore and guiding on obstructions in the water.

2. A fish trap is an inclosure with a blind opening where two fence-like walls extend outward like a funnel from the entrance. The time and effort

put into building a trap depends upon the need for food and the length of time you plan to stay in one spot.

3. If near the sea, pick a trap location at high tide and build it at low tide. On rocky shores, use natural rock pools. On coral islands, use natural pools on the surface of reefs by blocking the openings as the tide recedes. On sandy shores, use sandbars and the ditches they enclose. Fish in the lee of offshore sandbars. Build the trap as a low stone wall extending outward into the water and forming an angle with the shore.

4. In small, shallow streams, make a fish trap with stakes or brush set into the stream bottom so that the stream is blocked except for a small narrow opening into a stone or brush pen. Wade in and herd the fish into the trap. Catch or club them when they get into shallow water.

(*h*) *Shooting.*

1. If you have a weapon and sufficient ammunition, try shooting fish. Aim slightly under the fish in water that is less than three feet deep.

2. A hand grenade exploded in a school of fish will supply food for days. Dry or preserve those that are not eaten fresh.

(*i*) *Poisoning.* Throughout the warm regions of the world, there are various plants and other materials which natives use for poisoning fish. The active poison in these is harmful only to cold-blooded animals. Fish poisons include—

1. The derris plant. This woody vine grows in Southeastern Asia. Powder the roots and throw them into the stream at its head waters if possible.

In a short time, the stunned fish will rise to the surface (fig. 3–3).

2. *The Barringtonia tree.* This tree is found near the sea shore in Malaya and parts of Polynesia.

Figure 3–3. The derris plant.

Crush the seeds and throw them into the stream or pond (fig. 3–4).

Figure 3–4. Barringtonia tree.

3. Coral and sea shells. Lime will kill fish. Burn coral and sea shells together to obtain this fish poison.

(*j*) *Ice fishing.* Obtain fish in the winter by fishing through a hole in the ice. Keep the hole open by covering it with brush and heaping loose snow over the cover.

1. Fish tend to gather in deep pools, so cut ice holes over the deepest part of the lake. Place a rig similar to the one in figure 3–5 at several holes. When the flag moves to an upright position, remove the fish and rebait the rig.

2. Take a 3-foot pole and a string long enough to reach the bottom of the place where you

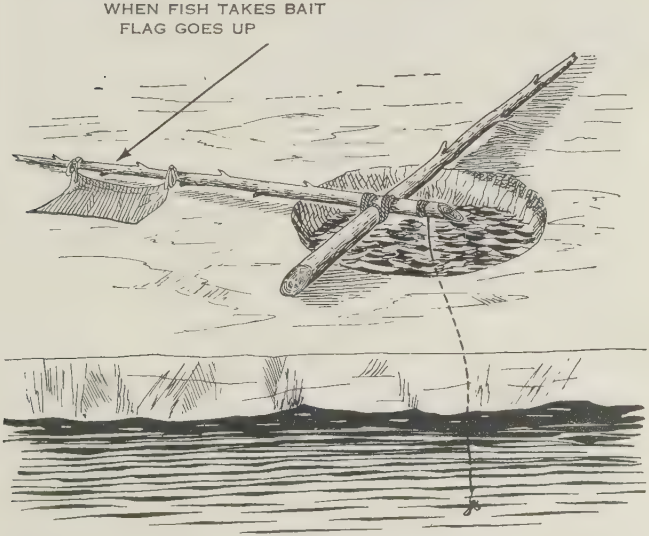


Figure 3–5. Automatic fisherman.

fish. Make a small spoon-shaped spinner from a C-ration can or from any piece of bright metal. Attach an improvised fish hook to the line and tie the improvised spinner to the line just above the hook. When fishing, move the rod in an up and down motion in such a way that the bright metal object vibrates. Fish close to the place where the shelf near the shore drops off to lake bottom, at the edge of the reeds, or closely to some projecting rock formation.

b. Frogs, Newts, and Salamanders. These small amphibious animals inhabit areas surrounding fresh water in warm and temperate climates throughout the world.

(1) Hunt frogs at night when they can be located by their croaking. Club them or snag the larger ones on a hook and line. Eat the entire body after skinning. For cooking, see chapter 4.

(2) Newts and salamanders are found under rotten logs or under rocks in areas where frogs are abundant.

c. Mollusks.

(1) These include fresh and salt water invertebrates such as snails, clams, mussels, bivalves, periwinkles, chitons, and sea urchins (fig. 3–6). Most members of this group are edible; however, be sure that the mollusk is fresh and that you boil it. If eaten raw, you are inviting parasites into your body.

(2) In fresh water, look for these food sources in the shallows, especially in water with a sandy or muddy bottom. Near the sea, wait for low tide and check in tidal pools or in the sand.

d. Crustaceans. Fresh and salt water crabs, crayfish, lobsters, shrimp, and prawns are included in

Figure 3–6. Invertebrates.

this class. Most of them are edible, but they spoil rapidly and some harbor harmful parasites. Look for them in moss beds under rocks or net them from tidal pools. Fresh water shrimp are abundant in tropical streams, especially where the water is sluggish. Here they cling to branches or vegetation. Cook

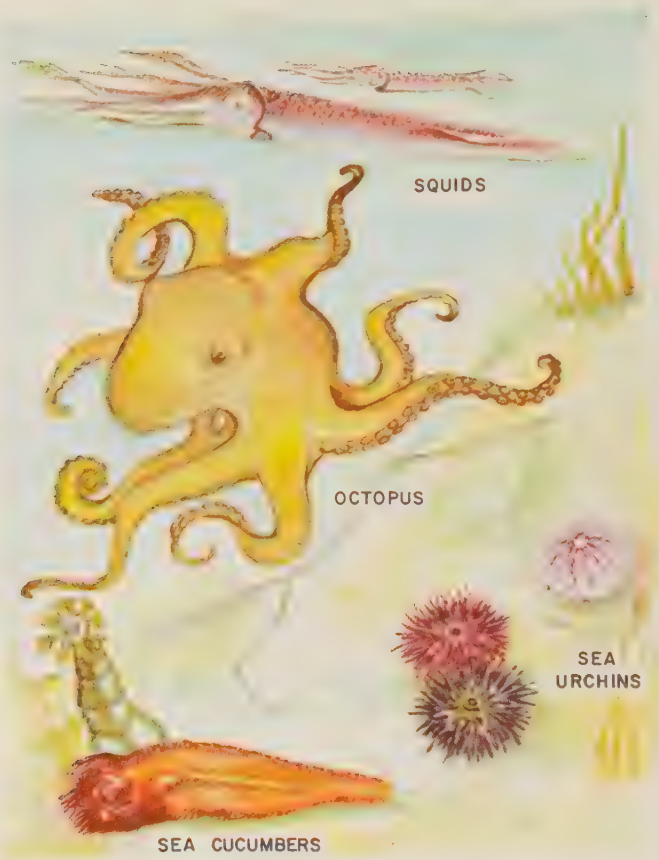


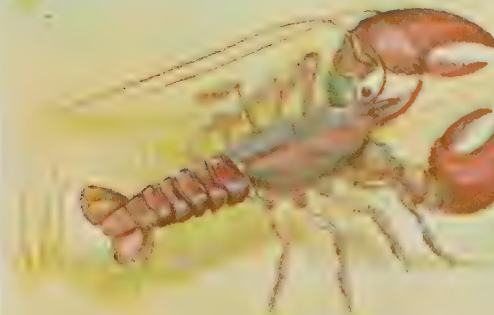
Figure 3–6.—Continued.

the fresh water forms; eat the salt water varieties raw if desired (fig. 3–7).

3–8. Reptiles

Do not discount snakes, lizards, alligators, and turtles as possible food sources (ch 2).

SALT WATER SHRIMP



COMMON LOBSTER

Figure 3–7. Crustaceans.

a. Fresh water snakes, both poisonous and nonpoisonous, frequent lakes and streams where the water is sluggish and the banks are covered with driftwood and overhanging branches. Although snakes are edible, use extreme caution when searching for them, especially in areas having poisonous varieties (ch 2).

FRESH WATER SHRIMP

SPINY LOBSTER

Figure 3–7—Continued.

b. Lizards are inhabitants of the tropics and subtropics. Included in this group are the two poisonous lizards mentioned in chapter 2, and alligators. All are edible. Remove the scaly skin and then boil or

Figure 3–7—Continued.

fry the meat; heat alligators over a fire, before skinning, to loosen the plates.

c. Marine fresh water and land turtles are edible and are found on land or in waters of the temperate

Figure 3–7—Continued.

and tropical zones. Club the smaller fresh water turtles, or catch them on a line. Be careful with the larger snapping ones because they can inflict a serious bite.

3–9. Insects

Grubs, grasshoppers, termites, and most other insects

have food value and are palatable if prepared properly. Use them to provide stock for soup or to add protein to stews (fig. 3–8). Be sure to cook grasshoppers to kill parasites contained in their bodies.

3–10. Birds and Mammals

a. General.

(1) All mammals and birds are edible but are probably the most difficult to obtain of all survival

Figure 3–8. Grub.

food. Consequently, concentrate on the sources mentioned above while considering methods of catching bigger game.

(2) Hunting animals and birds is not an easy job for even the most experienced woodsman; therefore, as a beginner, "still hunt". Find a place where animals pass—a trail, watering place, or feeding ground. Hide nearby, always downwind so the animal cannot detect your scent. Wait for game to come within range of your weapon or to walk into a trap. Remain absolutely motionless.

(*a*) When stalking an animal, do so downwind, moving slowly and noiselessly only when it is feeding or looking the other way. *Freeze* when it looks your way.

(*b*) Hunt in the early morning or at dusk and look for animal signs such as tracks, a game run, trampled underbrush, and droppings. Animals depend upon their keen sense of sight, hearing, and smell to warn them of danger.

(3) Birds can see and hear exceptionally well but are lacking in their sense of smell. During nesting periods they are less fearful of man. Because of this, you can catch them easier in the spring and summer, especially in temperate or arctic areas. They nest in cliffs, branches, marshes, or trees, and by watching the older birds you can locate the young or eggs.

b. Hunting.

(1) *Finding game.* The secret to hunting successfully is seeing the quarry before it sees you. Watch for signs that tell of the presence of game.

When approaching a ridge, lake, or clearing, slow down and peer first at distant, then closer, ground. At water holes that show signs of game, hide and wait until an animal approaches, even though it may take hours. In general, apply the military principles of movement and concealment.

(2) *Shooting game.* If you have a weapon and see a chance to use it, whistle sharply to encourage the quarry to stop, giving you a chance for a standing shot. On large game, aim for a neck, lung, or head shot. In the event you wound an animal and it runs, follow the blood trail slowly but deliberately. If wounded severely, the quarry will lie down soon if not followed, and usually will weaken and be unable to rise. Approach slowly and finish it off. After killing a large animal such as a deer, gut and bleed it immediately. Cut the musk glands from between the hind legs and at the joints of the hind legs. Be careful not to burst the bladder while removing this organ.

c. Trapping.

(1) *Know your game.*

(*a*) If you expect to trap with any luck, you must decide what kind of animal to trap, how the animal will react, and the type of bait to use.

(*b*) Rats, mice, rabbits, and squirrels are easy to trap. These small mammals have regular habits and confine themselves to limited areas of activity. Locate a hole or run, then bait and set the trap ((2) through (5) below).

(2) *Trapping hints.* Some tricks that may increase your "take" when trapping game or birds are as follows:

(*a*) To catch a mammal that lives in hollow trees, try inserting a short forked stick in the hole and twisting so that any loose skin will wrap around the fork. Keep the stick taut while pulling it out.

(*b*) Smoke burrow-living animals out of their dens; then using a noose attached to the end of a long pole, snare the quarry as it emerges from the hole.

(*c*) Bait a fish hook with a minnow and place it on the shore near the water. Chances are that a bird will snatch it.

(*d*) Set snares or traps at night in runways containing fresh tracks or droppings. Place snares in areas previously used for butchering animals. Use animal entrails for bait. After setting a trap in a runway, erect barriers on either side of it. These barriers should be made of dead branches, sticks, and dry leaves shaped to form a large "V." Funnel the animal into the trap. If the animal is moving slightly off the runway and should come in contact with the barrier, it will neither jump over nor walk on it. Instead, the animal will travel parallel to the barrier and go straight to the trap. After erecting the barriers, use animal blood or bladder contents to spread around the area. This will eliminate the human scent. When this is not possible, build a fire and smoke the area. The animal will not suspect anything after the area has been well smoked.

(3) *Hanging snare.* Fasten a slip noose to the end of a bent sapling. Open the noose wide enough to fit over the animal's head but not wide enough for its body to slip through. Secure the trigger so that it holds the sapling as shown in figure 3–9. Make

in sufficiently loose so that a slight jerk in the noose will free the trigger.

(4) *Simple drag noose.* This simple snare is basic to successful survival. It is effective for catching small game and birds.

(5) *Fixed snare.* This snare is particularly useful for catching rabbits. Fasten the loop to a log, tree, or forked stake and set it near a bush or limb as shown in figure 3–10.

(6) *Treadle spring snare.* This is effective for

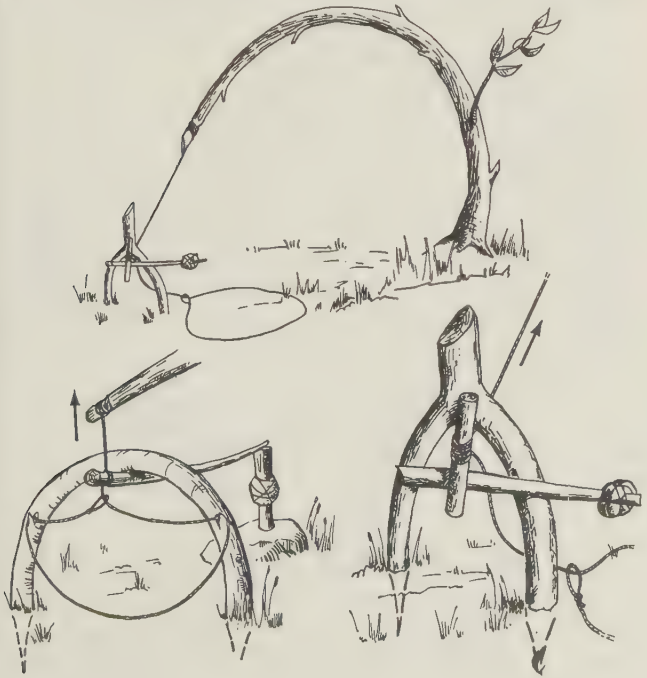


Figure 3–9. Hanging snares.

small mammals and birds. Cover the treadle with leaves or grass (fig. 3–11).

(7) *Spring and spear trap.* Trap jungle mammals using a bamboo spring and spear snare. As the quarry strikes the cord or wire that is secured to the trigger mechanism, the trigger is released and the spear is driven by the force of the bamboo spring (fig. 3–12).

(8) *Deadfall.*

(*a*) Catch medium to large sized animals in deadfalls; however, *use this method only where big-*

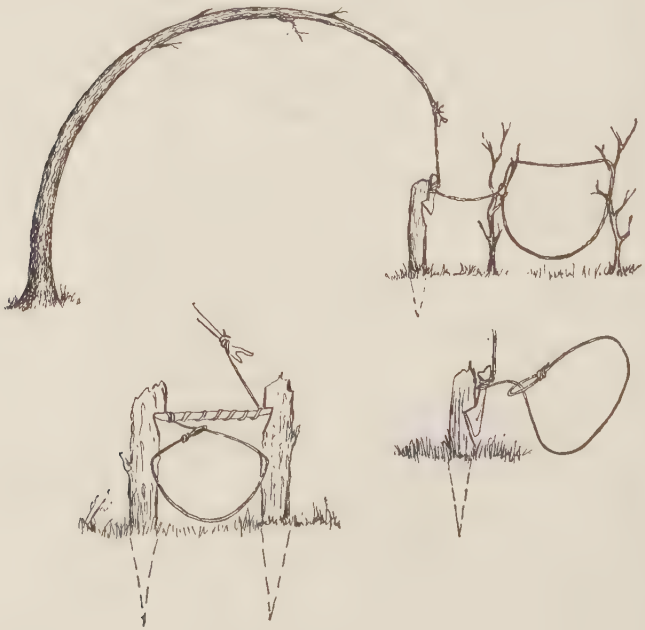


Figure 3–10. Fixed snare.

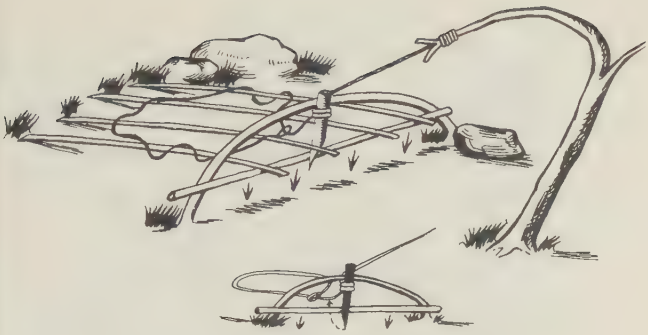


Figure 3–11. A treadle spring snare.

ger game exist in sufficient quantities to justify the time and effort required to construct this snare. Build the deadfall close to or across a game trail beside a stream or on a ridge. Be sure the fall log slides smoothly between the upright guideposts, and that you place the bait far enough from the bottom log to insure time for the fall log to drop before the animal can withdraw its head (fig. 3–13).

(*b*) Build a simple deadfall as shown in figure 3–14. Use a rock or heavy log and tilt it at a steep angle on a figure 4 trigger. Tie the bait on the trigger. When the game disturbs the bait, the weight will fall.

Section IV. WATER

3–11. The Dangers of Drinking Nonpotable Water

a. No matter how overpowering your thirst may seem, do not drink nonpotable water. One of the worst hazards to survival is waterborne diseases.

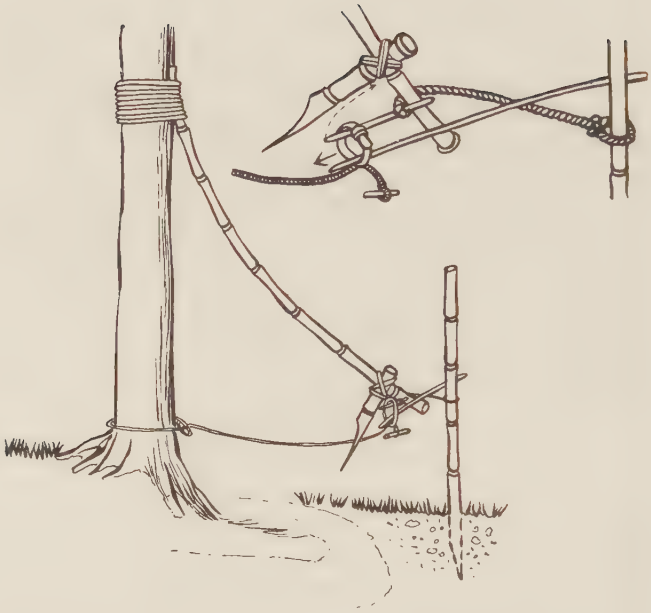


Figure 3–12. A spring and spear trap showing closeup of the spear and trigger.

Nonpotable water teems with disease organisms. Treat all water either by boiling for at least one minute or by using water treatment tablets.

b. Some of the diseases you may contract by drinking nonpotable water include dysentery, cholera, typhoid, leptospirosis and schistosomiasis.

(1) *Dysentery.*

(*a*) Dysentery is identified with severe and prolonged diarrhea with bloody stools, fever, and weakness.

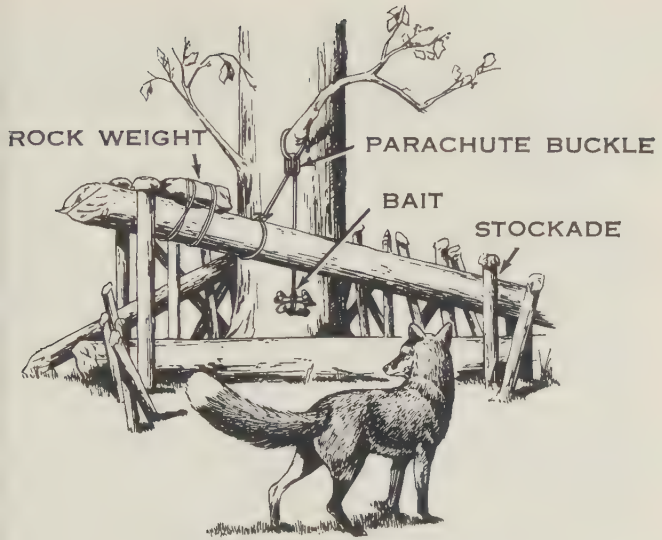


Figure 3–13. A fall log trap for big game.

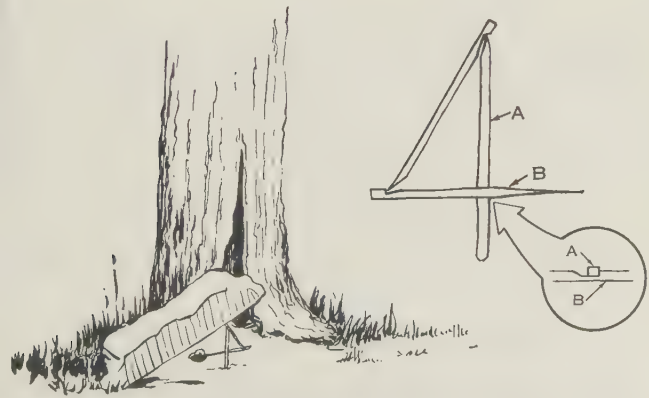


Figure 3–14. A simple deadfall using a figure 4 trigger.

(*b*) Eat frequently and try drinking coconut milk, boiled water, or the juice of boiled bark. Coconut milk is a laxative and the quantity consumed is important (para 3–17*c* (3) (*a*)). Eat boiled rice if it is available.

(2) *Cholera and typhoid.* Even though you have been inoculated, these diseases may be contracted unless you are very careful about the water you drink.

c. Nonpotable water may also contain flukes and leeches. Drinking water with these organisms can have severe consequences.

(1) *Flukes.* Blood flukes exist in stagnant, polluted water, especially in tropical areas. If swallowed, the fluke will bore into the bloodstream, live as a parasite, and cause painful, often fatal, diseases. Flukes (worm parasites) may also penetrate the unbroken skin while a person is wading or bathing in contaminated water.

(2) *Leeches.*

(*a*) Small leeches are particularly prevalent in African streams. If swallowed, a leech can hook itself to the throat passage or inside the nose. While in this position, it will suck blood, create a wound, and move to another area. Each new wound will continue to bleed, opening the door for infection.

(*b*) Sniff highly concentrated salt water to remove these parasites from the nose, or pick them out with improvised tweezers.

3–12. Muddy, Stagnant, and Polluted Water

a. If you have exhausted all other sources and are still without water, you may drink water from a

muddy or stagnant pool, even though it may have an odor and be unpleasant.

***Caution*: Before using, boil this water for at least 1 minute.**

b. To clear muddy water, let it stand 12 hours, or—

(1) Pass it through about three feet of bamboo that is filled with sand. Stuff grass in one end to contain the sand.

(2) Pour it into a cloth that has been filled with sand.

c. Boil polluted water and add charcoal from the fire to remove the odors. Let the water stand for about 45 minutes before drinking.

Section V. FINDING WATER

3–13. What Can You Drink?

When there is no surface water, tap through the earth's water table for ground water—rain or melted snow that has sunk into the ground. Access to this table and its supply of generally pure water depends upon the contour of the land and the type of soil (fig. 3–15).

Figure 3–15. Water table.

a. Rocky Soil.

(1) Look for springs and seepages. Limestones have more and larger springs than any other type rock. Because limestone is easily dissolved, caverns are readily etched in it by ground water. Look in these caverns for springs.

(2) Because lava rock is porous, it is a good source of seeping ground water. Look for springs along the walls of valleys that cross the lava flow.

(3) Look for seepage where a dry canyon cuts through a layer of porous sandstone.

(4) In areas abundant with granite rock, look over the hillsides for green grass. Dig a ditch at the base of the greenest area, and wait for the water to seep in.

b. Loose soil.

(1) Water is usually more abundant and easier to find in loose soil than in rocks. Look for ground water along valley floors or on the slopes bordering the valley, because it is in these areas that the water table is most likely to surface. Springs and seepages may also be found above the high watermark of rivers and streams after the water has receded.

(2) Before digging for water, look for signs that it is present. Dig in the floor of a valley under a steep slope, or dig out a green spot where a spring was during the wet season. In low forests, along the seashore, and in river plains, the water table is close to the surface. Very little digging usually yields a good supply of water.

(3) Runoff water is found above the water table and includes streams, stagnant pools, and water in bogs. Consider this water contaminated and dan-

gerous even if it is away from human habitation.

3–14. Along the Seashore

a. Water can be found in the dunes above the beach or even on the beach itself. Look in hollows between sand dunes for visible water, and dig if the sand seems moist. On the beach, scoop holes in the sand at low tide about 100 yards above the high tide mark. This water may be brackish, but it is reasonably safe. Run it through a sand filter to reduce the brackish taste.

b. Do not drink sea water. Its salt concentration is so high that body fluids must be drawn to eliminate it. Eventually the kidneys will cease functioning.

3–15. In Desert or Arid Lands

a. Watch for water indicators in desert or arid regions. Some signs are the direction in which certain birds fly, the location of plants, and converging game trails.

(1) The sand grouse of Asia, crested larks, and Zebra birds visit water holes at least once a day; parrots and pigeons must live within reach of water.

(2) Cattails, greasewoods, willows, elderberry, rushes, and salt grass grow only where ground water is near the surface. Look for these signs and dig. If you do not have a bayonet or entrenching tool, dig with a flat rock or sharp stick.

b. Desert natives often know of lingering surface pools in low places. They cover them in various ways, so look under likely brush heaps or in sheltered nooks, especially in semiarid and brush country.

c. Places that are visibly damp, where animals have scratched, or where flies hover, indicate recent surface water. Dig in such places for water.

d. Collect dew on clear nights by sponging it up with a handkerchief. During a heavy dew, you should be able to collect about a pint an hour.

e. For a detailed discussion of finding water in the desert, see chapter 7.

3–16. On Mountains

Dig in dry stream beds because water is often present under the gravel. When in snowfields, put snow in a container and place it in the sun out of the wind. Improvise tools from flat rocks or sticks if no digging equipment is available.

3–17. Water from Plants

If unsuccessful in your search for ground or runoff water, or if you do not have time to purify the questionable water, a water-yielding plant may be the best source. Clear, sweet sap from many plants is easily obtained. This sap is pure and chiefly water. Check the following sources in an emergency:

a. Plant Tissues.

(1) Many plants with fleshy leaves or stems store drinkable water. Try them wherever you find them.

(2) The barrel cactus of the southwestern United States is a possible source of water (fig. 3–16). Use it only as a last resort and only if you have the energy to cut through the tough, outer, spine-studded rind. Cut off the top of the cactus and smash the pulp within the plant. Catch the liquid in a container. Chunks may be carried as an emergency wa-

ter source. A barrel cactus 3½ feet high will yield about a quart of milky juice. *This is an exception to the rule that milky or colored sap-bearing plants should not be eaten.*

Figure 3–16. Water from a Barrel Cactus.

b. Roots of Desert Plants. Desert plants often have their roots near the surface. The Australian "water tree," desert oak, and bloodwood are some examples. Pry these roots out of the ground and cut them into 24- to 36-inch lengths. Remove the bark and suck out the water.

c. Vines, Palms, Coconuts.

(1) *Vines.* Not all vines yield palatable water, but try any vine found. Use the following method for tapping a vine. It will work on any species.

(*a*) Cut a deep notch in the vine as high up as you can reach.

(*b*) Cut the vine off closely to the ground and let the water drip into your mouth or a container.

(*c*) When the water ceases to drip, cut another section off the top. Repeat this until the supply of fluid is exhausted.

(2) *Palms.* Buri, coconut, sugar, and nipa palms contain a drinkable sugary fluid. To start the fluid of coconut palm flowing, cut off tip of the flower stalk after bending it downward. If a thin slice is cut off every 12 hours, you can renew the flow and collect up to a quart a day.

(3) *Coconut.*

(*a*) Select green coconuts. They can be opened easily with a knife, and they have more milk than ripe coconuts. Do not drink more than three or four cups of ripe coconut juice a day. *This juice is a violent laxative.*

(*b*) To open a coconut without a knife, find a sharp object such as a rock or a protruding stump, and bring the nut down on the point with sufficient force to break off the outer fibrous covering. The

milk can be obtained by piercing two eyes of the coconut with a sharp object such as a stick or a nail.

3–18. Plants That Catch and Hold Water

a. Bamboo stems often have water in the hollow joints. Shake the stems of old, yellowish bamboo. If a gurgling sound is heard, cut a notch at the base of each joint and catch the water in a container.

b. In the American tropics, the overlapping, thickly growing leaves of the pineapple-like bromeliads (fig. 3–17) may hold a considerable amount of rain water. Strain the water through cloth to eliminate most of the dirt and water insects.

c. Other water-yielding plants include the traveler's tree of Madagascar (fig. 3–18), the umbrella tree of western tropical Africa, and the baobab tree of northern Australia and Africa (fig. 3–19).

3–19. The Water "Still" [1]

a. Much of our domestic water supply comes from the ground. Underground rivers feed wells, lakes, and streams. Wells are drilled to tap the ground for water. The water "still" (fig. 3–20) does the same thing. The sun's heat raises the temperature of the air and soil under the plastic until the air is saturated—it can hold no more water vapor. Then the vapor begins to condense in tiny drops on the undersurface of the plastic, because the plastic is relatively cooler than the damp air under it. The drops slowly run down the sloping underside of the plastic and drip off into the bucket.

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[1] D. S. Halcey, Jr., *Outdoor Life*, August 1965.

Figure 3–17. Bromeliad catches water.

Figure 3–18. Traveler's tree

b. Because solar energy provides the heat for the still, it might seem logical that darkness would halt production. After sundown, however, the plastic cools rapidly, while the temperature of the soil re-

Figure 3–19. Baobab Tree.

mains relatively high. So water vapor continues to condense on the undersurface of the plastic. Stills produce about half as much water from 4 p.m. to 8 a.m. as they do during the daylight hours.

c. The basic materials for setting up your own survival still are—

(1) A 6 x 6-foot sheet of clear plastic.

(2) A bucket (two- to four-quart capacity).

(3) Flexible plastic tubing (about five feet).

You can manage without the plastic tubing, but it allows you to drink water without removing the bucket from the hole.

d. Because the plastic is slightly roughened, drops

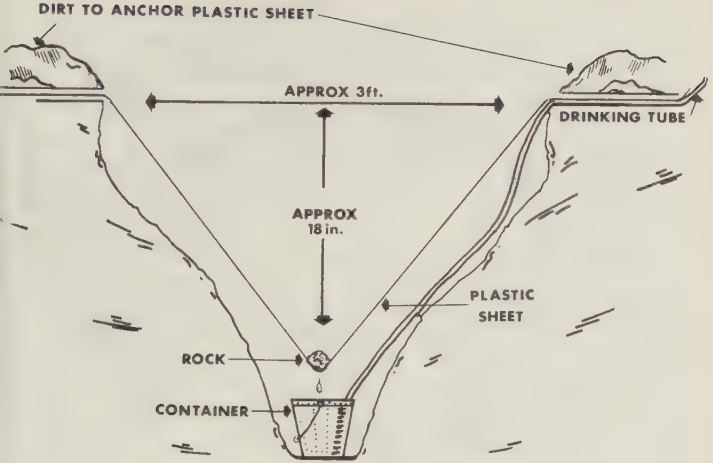

Figure 3–20. Water "still".

of water cling to it better than they do to ordinary plastic. Thus, water sticks to the plastic down to bottom and drops into the bucket instead of onto the ground.

e. It is possible to roughen the surface of other plastics such as Mylar with very fine wet or dry sandpaper.

f. Vapor should soon cloud the underside of the plastic, and drops should begin to trickle down toward the bucket. Do not expect to begin drinking water immediately. The least you should have in 24

Figure 3–20—Continued.

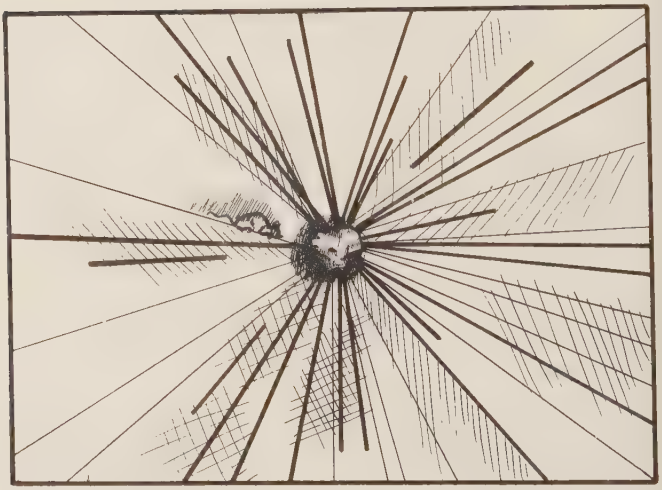

Figure 3–20—Continued.

hours is a pint; however, a quart or more may be obtained.

g. The "still" may also become a possible source of food. The water bucket under the plastic attracts snakes and small animals, which crawl down the top surface of the plastic and then cannot climb back out.

CHAPTER 4

FIREMAKING AND COOKING

Section I. FIREMAKING

4–1. Importance

a. Fire is needed for warmth, keeping dry, signaling, cooking, and purifying water by boiling. Survival time is increased or decreased according to your ability to build a fire when and where needed.

b. If matches are available, a fire can be built under any conditions of weather. When operating in remote areas, always carry a supply of matches in a waterproof case *on your person.* It is advisable to learn how to shield a match flame for some time in a fairly strong wind.

4–2. Fuel, Tinder, and Location

a. Small fires are easier to build and control than large fires. A series of small fires built in a circle around you in cold weather gives more heat than one big fire.

b. Locate the fire carefully to avoid setting a forest fire. If the fire must be built on wet ground or snow, first build a platform of logs or stones. Protect the fire from the wind with a windbreak or reflector (fig. 5–6). This will concentrate the heat in the desired direction.

c. Use standing dead trees and dry dead branches for fuel. The inside of fallen tree trunks will supply dry wood in wet weather. In treeless areas, rely on grasses, dried animal dung, animal fats, and sometimes even coal, oil shale, or peat, which may be exposed on the surface. If near the wreckage of an aircraft, use a mixture of gasoline and oil as fuel. Be careful how you ignite and feed the gasoline. Almost any plant can be used for firewood, but do not burn the wood of any contact poisoning plant (para 2–22).

d. Use kindling that burns readily to start the fire, such as small strips of dry wood, pine knots, bark, twigs, palm leaves, pine needles, dead upright grass, ground lichens, ferns, plant and bird down, and the dry, spongy threads of the giant puffball, which, incidentally, are edible. Cut dry wood into shavings before attempting to set it afire. One of the best and most commonly found kindling materials is punk, the completely rotted portions of dead logs or trees. Dry punk can be found even in wet weather by knocking away the soggy outer portions with a knife, stick, or even the hands. Paper or gasoline may be available as tinder. Even when wet, the resinous pitch in pine knots or dried stumps ignites readily. Loose bark of the living birch tree also contains a resinous oil which burns rapidly. Arrange this kindling in a wigwam or log cabin pile (fig. 4–1 and 4–2).

e. Bank the fire properly. Use green logs or the butt of a decayed punky log to keep the fire burning slowly. Keep the embers out of the wind. Cover them with ashes, and put a thick layer of soil over

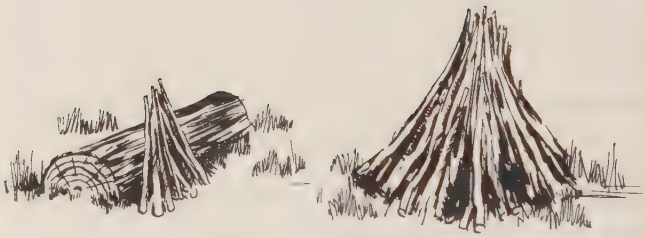

Figure 4–1. Tinder pile.

Figure 4–2. Log cabin pile.

them. It takes less work to keep the fire going than to build another one.

f. On polar ice, or in areas where other fuels are unavailable, blubber or other animal fat is a source

of fuel. Animal dung may be the only fuel in desert areas (para 7–6).

4–3. Fires Without Matches

a. Preparation. Prepare some extremely dry tinder before attempting to start a fire without matches. Once prepared, shelter this tinder from the wind and dampness. Some excellent tinders are punk, lint from cloth, rope or twine, dead palm frond, finely shredded dry bark, dry powdered wood, bird nests, wooly materials from plants, and wood dust produced by insects which is often found under the bark of dead trees. To save tinder for future use, store it in a waterproof container.

b. Sun and Glass. A camera lens, a convex lens from a binocular, or lens from a telescopic sight or flashlight may be used to concentrate the rays of the sun on the tinder.

c. Flint and Steel. This is the best method of igniting bone-dry tinder if you do not have matches. Use the flint fastened to the bottom of a waterproof match case. A hard piece of stone will serve as a substitute. Hold the flint as near the tinder as possible and strike it with a knife blade or other small piece of steel. Strike downward so that the sparks will hit in the center of the tinder. When the tinder begins to smolder, fan or blow it gently into a flame. Gradually add fuel to the tinder, or transfer the burning tinder to the fuel pile. If you do not get a spark with the first rock, try another (fig. 4–3).

d. Wood Friction. Since the use of friction is a difficult method of starting a fire, use it only as a last resort.

Figure 4–3. Flint and steel.

(1) *Bow and drill.* Make a strong bow strung loosely with a shoelace, string, or thong. Use it to spin a dry, soft shaft in a small block on bone-dry hardwood. This forms a black powdered dust which eventually catches a spark. When smoke begins to rise, there should be enough spark to start a fire. Lift the block and add tinder (fig. 4–4).

(2) *Fire thong.* Use a strip of dry rattan, preferably about one-fourth inch in diameter and about two feet long, and a dry stick. Elevate this stick off the ground. Split the end of the elevated stick and hold it open with a small wedge. Place a small wad of tinder in the split, leaving enough room to insert the thong behind it. Secure the stick with your foot, and work the thong back and forth (fig. 4–5).

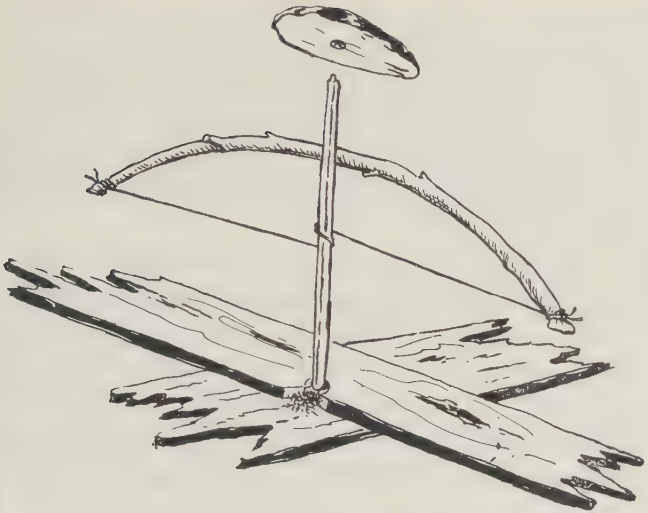

Figure 4–4. Bow and drill.

Figure 4–5. Fire thong.

(3) *Fire saw.* The fire saw consists of two pieces of wood which are sawed vigorously against each

other. This method of starting fires is commonly used in the jungle. Use split bamboo or other soft wood as a rub stick and the dry sheath of the coconut flower as the wood base. A good tinder is the fluffy brown covering of the apiang palm and the dry material found at the base of the coconut leaves (fig. 4–6).

(4) *Ammunition and powder.* Prepare a sheltered pile of kindling and wood. Place the powder from several cartridges at the base of the pile. Take two rocks and sprinkle a little powder on one rock. Then grind the two rocks together immediately above the powder at the base of the pile. This will ignite the powder on the rock and, in turn, the larger amount of powder and kindling wood.

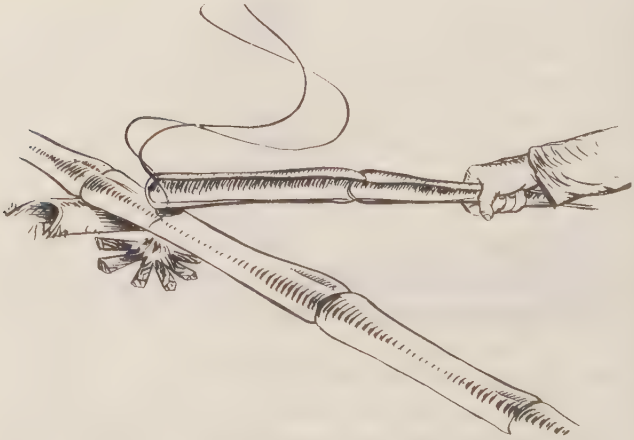

Figure 4–6. Fire saw.

4–4. Cooking Fires

a. A small fire and some type of stove is best for cooking purposes. Place the firewood crisscross and allow it to burn down to a uniform bed of coals. Make a simple fireplace by using two logs, stones, or a narrow trench on which to support a vessel over the fire.

b. A hobo stove made out of a tin can conserves fuel and is particularly suited to the Arctic (fig. 4–7).

c. A simple crane propped on a forked stick will hold a cooking container over a fire (fig. 4–8).

d. A bed of hot coals provides the best cooking heat. If a crisscross fire is made, the coals settle uniformly.

e. A fire that is to be used for baking should be built in a pit and allowed to burn into a bed of coals.

f. An underground fireplace, developed by the Indians, adds one or more vents on the upwind side. The vent(s) provide(s) an in-built draft for the fire burning under a cooking utensil in much the same way as a chimney stove. This type of cooking fire has a distinct advantage in survival situations, where security is essential, since it will substantially reduce the smoke and flame incidental to cooking. It will also serve to reduce the effects of a high wind (fig. 4–9).

Section II. COOKING

4–5. Skinning and Cleaning

a. Fish. As soon as fish is caught, cut out the gills and large blood vessels that are next to the back-

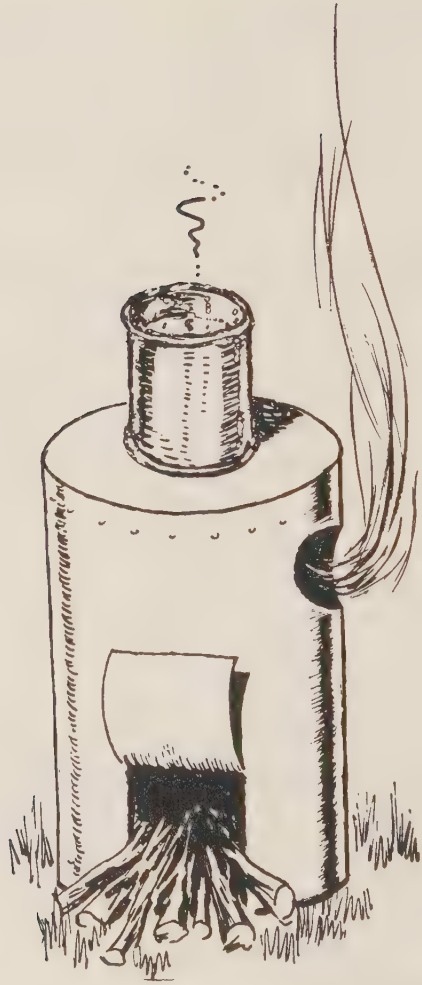

Figure 4–7. Hobo stove.

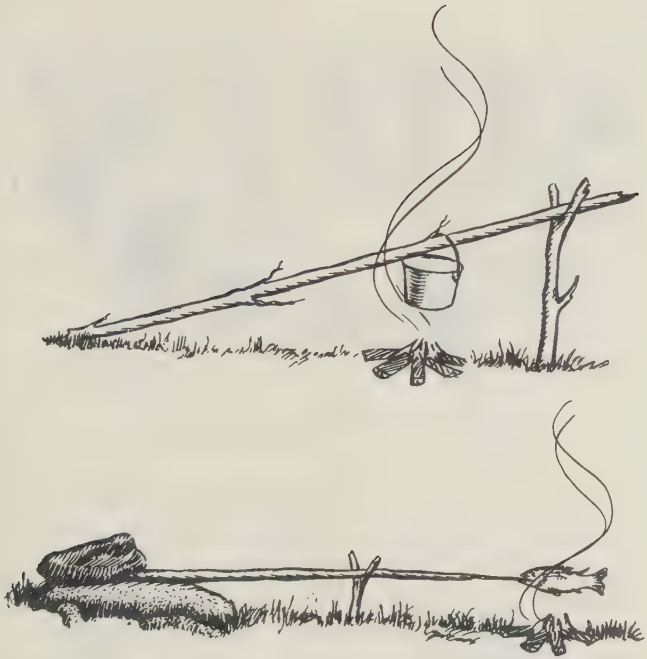

Figure 4–8. Simple crane.

bone. Scale it. Gut the fish by cutting open its stomach and scraping it clean (fig. 4–10). Cut off the head unless you want to cook the fish on a spit. Fish like catfish have no scales. Skin them. Small fish under four inches require no gutting, but should be scaled or skinned.

b. Fowl.

(1) Most fowl should be plucked and cooked with the skin on in order to retain its food value. After the bird is plucked, cut off the neck close to the

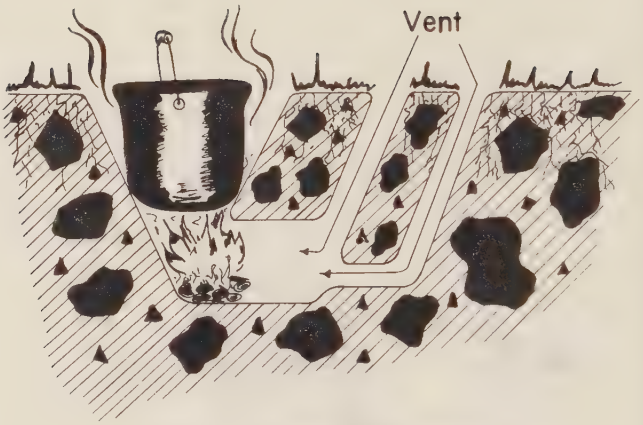

Figure 4–9. Underground fireplace.

body and clean out the insides through the cavity. Wash it out with fresh, clean water. Save the neck, liver, and heart for stew. It is easier to pluck a fowl after scalding it. Waterfowl are an exception; they are easier to pluck dry. After the fowl is cooked, it can be skinned to improve flavor. Food value, however, is lost.

(2) Scavenger birds like vultures and buzzards should be boiled for at least 20 minutes to kill the parasites.

(3) Save all feathers. They can be used for insulating your shoes or clothing or for bedding.

c. Animals.

(1) *Skinning and dressing.* Fleas and parasites will leave a cooled body. Wait until this occurs before cleaning and dressing the carcass. Cleaning should be done near running water if possible where entrails may be disposed of and where the carcass

BLEEDING

SCALING

GUTTING

SKINNING

Figure 4–10. Dressing fish.

can be washed. To prepare light and medium sized animals—

(*a*) Hang the carcass head downward from a convenient limb. Cut its throat and allow the blood to drain into a container. Boil the blood thoroughly. It is a valuable source of food and salt.

(*b*) Make a ring cut at the knee and elbow joints and a "Y" cut down the front of each of the hind legs and down the belly as far as the throat.

(*c*) From the belly make a cut down each foreleg.

(*d*) Make a clean circular cut around the sex organs.

(*e*) Working from the knee downward, remove the skin. The skin of a freshly killed carcass will pull off like a well-fitted glove.

(*f*) Cut open the belly. Pin the flesh back with wooden skewers, and remove the entrails from the windpipe upward, clearing the entire mass with a firm circular cut to remove the sex organs.

(*g*) Save the kidneys, liver, and heart. Use the fat surrounding the intestines. All parts of the animal are edible, including the meaty parts of the skull such as the brain, eyes, tongue, and fleshy portions. Check the heart, kidneys, liver, and intestines for spots or worms. If the animal is diseased in any manner, danger is present while handling the meat and preparing it for cooking. If you have gloves, use them while preparing the animal. They will help prevent you from contracting the disease. Once the animal has been well cooked, there is little chance of sickness, even though the animal was diseased.

(*h*) Do not throw away any part of the animal. The glands and entrails and reproductive re-

gions can be used for bait in traps and fishlines.

(*i*) Save the skin. It is light when dried and is good insulation as a bed cover or article of clothing. The skin may be cured by removing all excess flesh and stretching the hide on a frame (fig. 4–11). Tannic acid can be obtained by stripping the inner bark from oak trees and soaking it in water. The stronger the solution, the more effective it will be. The hide should be alternately soaked in this solution, then suspended in a shady place to dry. The greater the number of applications, the better the hide will be cured. Tannic acid is also found in chestnut, mimosa, and hemlock trees and in tea.

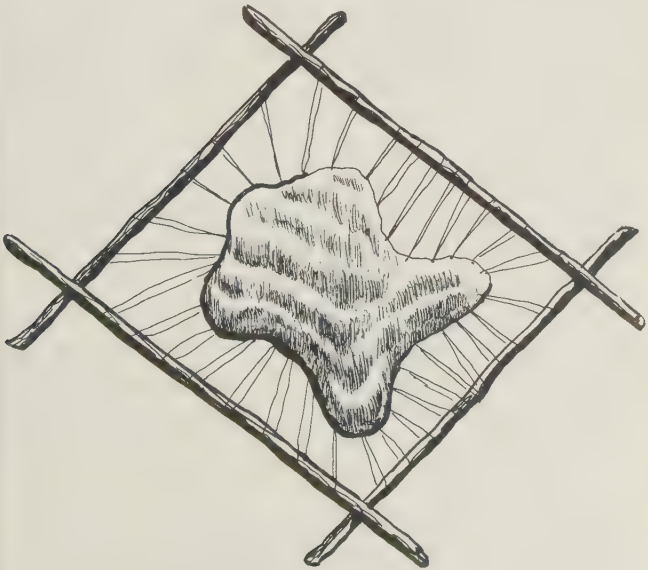

Figure 4–11. Stretching a hide.

(2) *Larger animals.* To prepare, follow the steps outlined in (1)(*a*) through (*i*) above, except that hanging the carcass may be impossible because of the lack of a suitable method of hoisting the animal.

(3) *Rats and mice.* Both rats and mice are palatable meat, particularly if cooked in a stew. These rodents should be skinned, gutted, and boiled. Rats and mice should be boiled about 10 minutes. Either may be cooked with dandelion leaves. Always include the livers.

(4) *Rabbits.* Rabbits are tasty but provide no fats to a diet. They are easy to trap and kill. To skin, make an incision behind the head or bite out a piece of skin to allow insertion of the fingers. Peel back the hide. To clean it, make an incision down the belly, spread open, and shake strongly. Most of the intestines will fall out. What remains can be scraped and washed out.

(5) *Other edible animals.* All mammals are edible, regardless of what they are. Dogs, cats, hedge hogs, porcupines, and badgers should be skinned and gutted before cooking. Prepare them as a stew with a quantity of edible leaves.

d. Reptiles. Snakes (excluding the sea snakes) and lizards are edible. Remove the head and skin before eating. Lizards are found almost everywhere, especially in tropical and substropical regions. Broil or fry the meat.

4–6. How to Cook

a. Purpose. Cooking makes most foods more tasty and digestible, and destroys bacteria, toxins, and harmful plant and animal products.

b. Boiling.

(1) *General.* When meat is tough, or when other foods require long cooking, boiling is the best way to prepare it for later frying, roasting, or baking. Boiling is probably the best method of cooking because it conserves the natural juices of the food. The "stock" that is obtained from boiling is excellent nourishment containing, among other things, much needed salt and fat. Boiling is difficult in high altitudes and is impractical at altitudes in excess of 12,000 feet.

(2) *Vessels for boiling.* Water can be boiled in vessels made of bark or leaves, but such containers burn above the waterline unless the vessel is kept moist or the fire kept low. Half a green coconut or a section of bamboo cut well above or just below a joint can be used as a container for boiling. Such containers will not burn until after the water boils. Birchbark and banana leaves also make good containers (fig. 4–12). Secure the sides with thorns or slivers of wood. Water can be boiled in a scooped out hole in clay or in a hollow log by dropping heated stones into it.

c. Roasting or Broiling. This is a quick way to prepare wild plant food and tender meat. Roast meat by putting it on a stick and holding it near embers. A crane (fig. 4–8) may be used. Roasting hardens the outside of the meat and retains the juices.

d. Baking Baking is cooking in an oven over steady, moderate heat. The oven may be a pit under the fire, a closed vessel, or a leaf or clay wrapping. To bake in a pit, first fill it with hot coals. Drop the

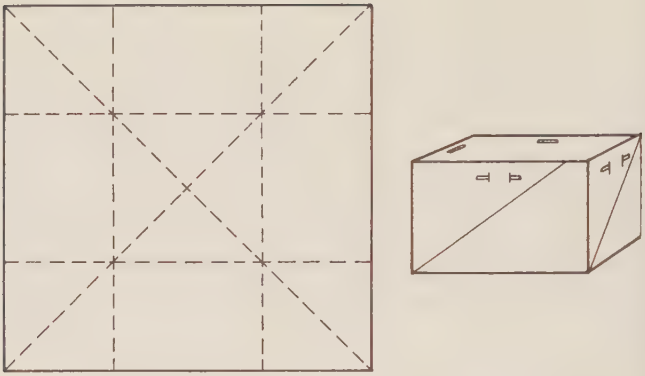

Figure 4–12. Birchbark vessel.

covered vessel containing water and food in the pit. Place a layer of coals over it and cover with a thin layer of dirt. If possible, line the pit with stones so that it holds more heat. Pit cooking protects food from flies and other pests and reveals no flame at night.

e. Steaming. Steaming can be done without a container and is suitable for foods that require little cooking, like the shellfish. Place the food in a pit filled with heated stones over which leaves are placed. Put more leaves over the food. Then force a stick through the leaves down to the food pocket. Pack a layer of dirt on top of the leaves and around the stick. Remove the stick and pour water to the food through the hole that remains. This is a slow way to cook, but it is effective.

f. Parching. Parching may be a desirable method of preparing some foods, especially grains and nuts. To parch, place the food in a metal container and

heat slowly until it is thoroughly scorched. In the absence of a suitable container, a heated, flat stone may be used.

g. Utensils. Anything that holds food or water may be used as a container—turtle shells, sea shells, leaves, bamboo, or a section of bark.

h. Cooking Plant Food. Soaking, parboiling, cooking, or "leaching" are methods of improving taste. Circumstances and the nature of the food dictate the method. Acorns can be made palatable by being "leached." (Leaching is done by crushing food and pouring boiling water through it while it is held in a strainer of some sort.)

(1) *Pot herbs.* Boil leaves, stems, and buds until tender. If the food is bitter, several changes of water will help to eliminate the bitterness.

(2) *Roots and tubers.* These can be boiled, but are more easily baked or roasted. Some roots and tubers *must* be boiled to remove harmful substances such as oxalic acid crystals.

(3) *Nuts.* Most nuts can be eaten raw, but some, such as acorns, are better crushed then parched. Chestnuts are tasty roasted, steamed, or baked.

(4) *Grains and seeds.* Grains and seeds are more tasty when parched, but can be eaten raw. Grains and seeds may be ground into meal or flour.

(5) *Sap.* You can dehydrate to a syrup any sap containing sugar. Boil away the water.

(6) *Fruit.* Bake or roast tough, heavy-skinned fruit and boil juicy fruit. Many fruits, however, are palatable raw.

i. Cooking Animal Food.

(1) *General.* Boil animals larger than a domes-

tic cat before roasting or broiling them. Cook the meat as fast as possible when broiling because it toughens over a slow fire. When cooking larger animals, cut them into small pieces. If the meat is exceptionally tough, stew it with vegetables. When baking or broiling any type meat, use fat if possible. When baking, put the fat on top so that it melts and runs over the meat.

(2) *Small game.* Small birds and mammals can be cooked whole or in part, but remove entrails and sex glands before cooking. Wrap a big bird in clay and bake it. The clay removes the feathers when it is broken from the cooked carcass. Boiling is the best method of cooking small game because there is less waste. Add taste to the bird by stuffing it with coconut, berries, grains, roots (onions), and greens.

(3) *Fish.* Fish may be roasted on an improvised grill of green sticks or baked in leaves and clay, or they may be cooked over direct heat by using a crane. All fresh water fish and other fresh water foods should be thoroughly cooked because they may contain disease-producing organisms.

(4) *Reptiles and amphibians.* Frogs, small snakes, and lizards can be roasted on a stick. Large snakes and eels are better if boiled first. Boil turtles until the shell comes off. Cut up the meat and mix it with tubers and greens to form a soup. Salamanders, roasted on a stick, are edible. Skin all frogs and snakes before cooking. The skin of a snake is not toxic, but its removal improves the taste of the meat.

(5) *Crustaceans.* Crabs, crayfish, shrimp, prawns, and other crustaceans require cooking in

order to kill disease-producing organisms. They spoil rapidly, however, and should be cooked immediately after capture. Cook them alive by dropping them in boiling water.

(6) *Mollusks.* Shellfish can be steamed, boiled, or baked in the shell. Shellfish make an excellent stew with greens or tubers.

(7) *Insects.* Grasshoppers, locusts, large grubs, termites, ants, and other insects are easy to catch and will provide nourishment in an emergency (para 3–6).

(8) *Eggs.* Edible at all stages of embryo development, eggs are among the safest of foods. Hard boiled eggs can be carried for days as reserve food.

j. Seasoning. Salt can be obtained by boiling seawater. The ashes of burned nipa palm boughs, hickory, and some other plants contain salt that can be dissolved in water. When the water has been evaporated, the salt has a black tint. The citric acid in limes and lemons can be used to pickle fish and other meat. Dilute two parts fruit juice with one part salt water. Allow the fish or meat to soak for half a day or longer.

k. Baking Bread. Bread may be made with flour and water. If possible, use sea water for the salt. After kneading the dough well, place it in a sand-lined hole. Then place sand on top of the hole and cover the dough with glowing coals. By experimentation, you should be able to get the dough and temperture correct enough to prevent sand from clinging to the cooked bread. Another method of baking bread is to twist it around a green stick from which the bark has been removed and place it over a fire.

The stick should be bitten first to determine if the sap is so sour or bitter that it will affect the taste of the bread. Bread may also be made by spreading dough into thin sheets on a hot rock. A little leaven (dough allowed to sour) added to the bread dough improves the loaf.

4–7. Preserving Food

a. Freezing. In cold climates, preserve excess food by freezing (para 5–6).

b. Drying. Plant food can be dried by wind, sun, air, or fire, or any combination of these four. The object is to remove the water.

(1) Cutting the meat "with the grain" in one-fourth inch strips and drying it in the wind or in smoke will produce "jerky." Put the strips of meat on a wooden grate and dry until the meat is brittle. Use willow, alders, cottonwood, birch, and dwarf birch for firewood because pitch woods such as pine and fir make the meat unpalatable. A parateepee (fig. 5–7) makes a good smoking house when the flaps at the top are closed. Hang the meat high and build a slow smouldering fire under it. Perhaps a quicker way of smoking meat is by the following method—dig a hole in the ground about 1 meter deep and one-half meter wide. Make a small fire at the bottom of the hole (after starting the fire, use green wood for smoke). Place an improvised wooden grate about three-fourths of a yard up from the bottom. Use poles, boughs, leaves, or any available material to cover the pit. After one night of heavy smoking, the meat should be in a condition to remain edible for 5 to 7

days. If it is possible to smoke the meat for 2 nights, it will remain edible for 2 to 4 weeks or longer. When properly smoked, the meat should look like a dark, brittle, curled stick, but it is very tasty and nutritious.

(2) The methods of preserving fish and birds are much the same as for other meats. To prepare fish for smoking, cut off the heads and remove the backbones. Then spread the fish flat and skewer them in that position. Thin willow branches with bark removed make good skewers. Fish may also be dried in the sun. Hang them from branches or spread them on hot rocks. When the meat dries, splash it with sea water to salt the outside. Do not keep sea food unless it is well dried and salted.

(3) Plantains, bananas, breadfruit, leaves, berries, and other wild fruits can be dried by air, sun, wind, or fire, with or without smoke. Cut fruit into thin slices and place them in the sun or next to a fire.

4–8. Poisonous Plant and Animal Foods

There are relatively few poisonous plants and animals. Learn the ones that are edible. There are some parts of animals, such as polar bear liver, that are poisonous to man. These and other poisonous food are covered in chapter 2. Plants that are poisonous to eat and touch and certain poisonous sea foods are also identified in chapter 2.

CHAPTER 5

SURVIVAL IN COLD WEATHER AREAS

5–1. Climate and Weather

a. Temperature.

(1) *Arctic.* Summer temperatures above 65° F. are common except on glaciers and frozen seas. Temperatures in winter sometimes reach −70° F, and range up to a maximum of 32° F.

(2) *Subarctic.* Summers are short with temperatures ranging above 50° F, and occasionally reaching 100° F. Winters are the coldest in the northern hemisphere, ranging to extremes from −60° F. to −80° F in North America, and even lower in Siberia.

b. Winds. In winter, the wind, when accompanied by low temperatures, chills man quickly. Wind-chill is the combined cooling effect of air, temperature, and wind on a heated body, rather than the temperature as recorded by a thermometer.

c. Precipitation. Many areas of the Far North receive less precipitation in the form of rain or snow than the dry southwestern United States. The average annual precipitation in the subarctic, except near seacoasts, is the equivalent of 10 inches of rainfall, while in the Arctic it is generally 5 inches or less.

d. Landscape. Landscape varies very widely in subarctic and arctic lands including practically every gradation between mountain peaks and glaciers to the flattest of plains. Summer surface conditions in both the arctic and subarctic also include practically every gradation between the extremes of the hardest and roughest surfaces to the softest and wettest surfaces. In winter, frozen lakes, rivers, and swamps become the highways of the north.

5–2. Chance of Survival

The odds of surviving in these areas of extremes are better than you think. The proper attitude—a will to survive—and a few elementary precautions will increase your chances. Learn to work with nature, not against it.

5–3. Travel

a. The secret of successful travel in cold weather areas is adequate protective clothing, sufficient food, rest, and a steady pace. Neither food and rest nor a steady pace is enough to permit survival without adequate protective clothing in the extreme cold and wind of the arctic. Unless properly equipped, a better course of action in the Arctic would be to immediately seek shelter, build a fire, and "hole up" to conserve heat and energy. When weather and health conditions permit, make every effort to contact friendly inhabitants or reach friendly lines. If the enemy or hostile population forces you to move or practice security measures, survival techinques must be varied accordingly. Evaluate climatic and physical hazards and hostile attitudes, and decide which

presents the most immediate threat. When stranded in friendly territory, remain close to disabled aircraft or vehicles, and employ the ground-to-air emergency code (fig. 2–10).

b. The course should be determined by your location and the terrain. In mountainous or wooded areas, it is advisable to follow rivers downstream toward populated areas. Siberia, where rivers flow northward, is an exception. Populous areas lie south in Siberia and European Russia; there are only a few scattered natives in these areas.

c. When traveling cross-country, try to follow the contour of the land; however, note that valley floors are frequently colder than slopes and ridges, especially at night. Head for a coast, major river, or known point of habitation.

d. During the arctic winter, there are four basic requirements that must be met to travel successfully—

(1) *Determining direction.* Know your exact departure location and the location of your objective (para 2–4). A highly accurate determination of true north can be obtained by suspending an improvised plumb bob from an inclined stick. This method can be used anywhere on earth, but it is especially useful in the true Arctic, because other methods tend to be unreliable and the North Star is too high in the sky. The makeshift plumb bob, consisting of a stone or

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* This material, including figure 5–1, was adapted from the book, *Better Ways of Pathfinding,* published by Stackpole Company, Harrisburg, Pa., copyrighted © 1964 by Robert S. Owendoff, 153 Gundry Drive, Falls Church, Virginia, 22046.

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other small, heavy object, is suspended by a string from the *end* of an inclined stick, point D (fig. 5–1). Sometime in the morning, mark the stick's shadow tip, point B. Using the point A on the ground directly underneath the plumb bob as center, draw a semicircle passing through this shadow-tip mark. In the afternoon, the stick's shadow tip will cross the semicircle at point C. Draw a straight line connecting B and C. The line bisecting line BC and drawn from A, points true north. Constellations as well as Arctic "visual aids" can be used to determine direction. For instance, snowdrifts usually are on the lee or downward side of protruding objects like rocks, trees, clumps of willows, or high banks. By determining the cardinal points of the compass and from them the direction of the drifts, the angle at which you cross them will serve as a check point in maintaining a course. The snow on the southside of the ridges tends to be more granular than on the north. Other aids to determining direction are willows, alders, and poplars, which tend to lean toward the south, and coniferous trees which are more bushy on the southside. Use these aids as a means of *very rough* estimation.

(2) *Physical stamina.* Survival is synonymous with "take your time". Without proper equipment and in poor weather, there are few people who possess sufficient stamina to travel successfully in the arctic.

(3) *Clothing.* Sufficient clothing is necessary to remain dry and must be appropriate for the season and terrain.

(4) *Food, fuel, and shelter.* These necessities

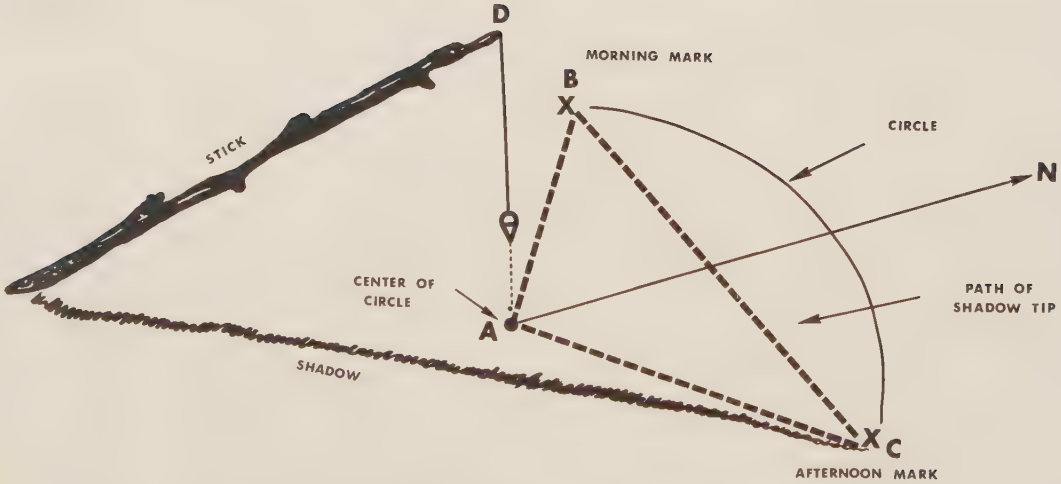

Figure 5–1. Determining direction by the plumb bob method.

must be available in sufficient quantities to sustain you, or you must have the equipment necessary to obtain them. More food is required when traveling than when inactive. Therefore, if food is limited and little game is present in the area to be traveled, make certain that travel is the only solution.

e. Obstacles to summer travel are dense vegetation, rough terrain, insects, soft ground, swamps and lakes, and unfordable rivers. Winter obstacles are soft snow, dangerous river ice, severe weather conditions, scarcity of native food, and "overflows" (stretches of water covered only by thin ice or snow). When traveling in the arctic you should—

(1) Avoid traveling during a blizzard.

(2) Take care when crossing thin ice. Distribute your weight by lying flat and crawling.

(3) Cross streams when the water level is lowest. Normal freezing and thawing action may cause a stream level to vary as much as 2 to 2½ meters per day. This may occur at any time during the day, depending on the distance from the glacier, the temperature, and the terrain. This variation in stream level should also be considered when selecting a camp site near a stream.

(4) Take into consideration the clear arctic air which makes distance estimation difficult. Underestimates of distances are more frequent than overestimates.

(5) Avoid travel in "white out" conditions when lack of contrast makes it impossible to judge the nature of the terrain.

(6) Always cross a snow bridge at right angles to the obstacle it crosses. Find the strongest part of

the bridge by poking ahead with a pole or ice-axe. Distribute your weight by wearing snowshoes or skis or by crawling.

(7) Make camp early to have plenty of time to build a shelter.

(8) Consider rivers as avenues of travel, frozen or unfrozen. When rivers are frozen, they frequently are clear of loose snow, and the ice makes for easier travel.

f. The ability to travel successfully over snow-covered terrain is directly related to the following factors:

(1) The ability to use, and the availability of, over-snow equipment. If you possess some previous training in cross-country skiing and equipment is available, travel on skis is recommended. In most snow conditions and over most types of terrain, skis provide the speediest and most energy-saving mode of travel. Use of snowshoes requires hardly any previous training, but your speed will be much slower and travel more exhausting.

(2) In deep, loose snow, skiing is exhausting, and if you have a choice of equipment, snowshoes are recommended. A light crust on the surface of the snow, however, prevents skis from sinking and provides for speedy and easy skiing. A crust hard enough to support a man makes travel on foot feasible, but even then, if equipment is available and you possess the necessary proficieny, travel on skis is recommended.

(3) Improvise equipment for travel if snow is loose and deep. Make snowshoes of willow or other green wood, using a wood separator and thong,

wire, cord, or suspension lines (fig. 5–2). If wreckage of an aircraft is available, make snowshoes out of seat bottoms, inspection plates, and other parts of salvage.

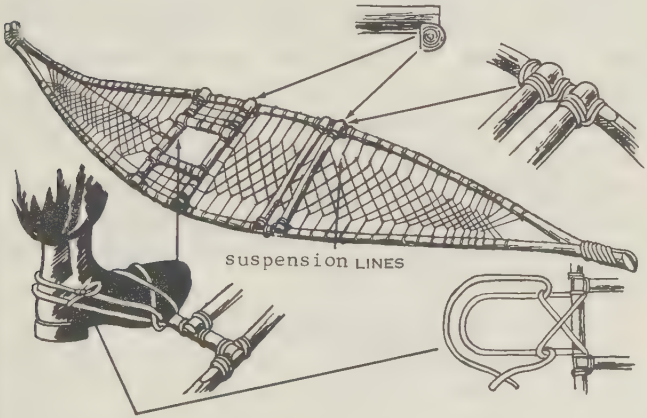

Figure 5–2. Improvised Snowshoes.

5–4. Shelther

a. Cold Can Kill. Protection is necessary to survive in winter cold. During the summer, however, shelter may be needed only as protection against insects and the sun. Suitable natural shelter may be available in caves, rock overhangs, crevices, bushy clumps, or natural terraces.

b. Selecting a Site. Ideal sites for shelter differ in winter and summer. The choice during winter depends upon protection from the wind and cold, and nearness to fuel and water. In mountainous areas, the danger of avalanches, rock falls, and floods must

be considered. A site should not be selected under large trees, because frozen branches (commonly known as "widow makers"), tend to fall in a spear-like manner which could be fatal to an individual if hit. A site should be chosen during the summer months which is relatively free of insects and near fuel and water. As protection against insects, it is better to select a site on a breezy ridge or in a place that receives an onshore breeze. Sites in forests and near rapid streams are desirable. Since you may be in a situation where concealment is the most important factor, the site should afford good observation and have one or two concealed routes of escape from it.

c. Types of Shelter. The type shelter built depends upon the materials and time available. Regardless of the type, however, the Arctic shelter must serve the principal purpose of holding the heat of a fire or that of the body around you so that you remain warm. Body heat is retained longer in still air. For this reason, build the shelter small, snug, and windproof. It must also provide adequate ventilation to prevent asphyxiation. Make a hole at the top of the shelter to allow carbon monoxide gases and smoke to escape. Leave a small crack near the bottom to let fresh air enter.

(1) On pack ice or snow-covered barren land, dig in or build up the ice and snow. Building up is sometimes easier than digging in. Since a projecting shelter, however, is more readily seen, its use may be inadvisable from an evasion standpoint.

(2) Of several kinds of improvised shelters, perhaps the simplest is provided by a hard-packed

snow drift hollowed out to accommodate one or more men. Even a hole in the snow provides temporary emergency shelter. This type of shelter is sometimes difficult to prepare because of the hardness of the packed snow, and frequently is impossible without proper tools. (fig. 5–3).

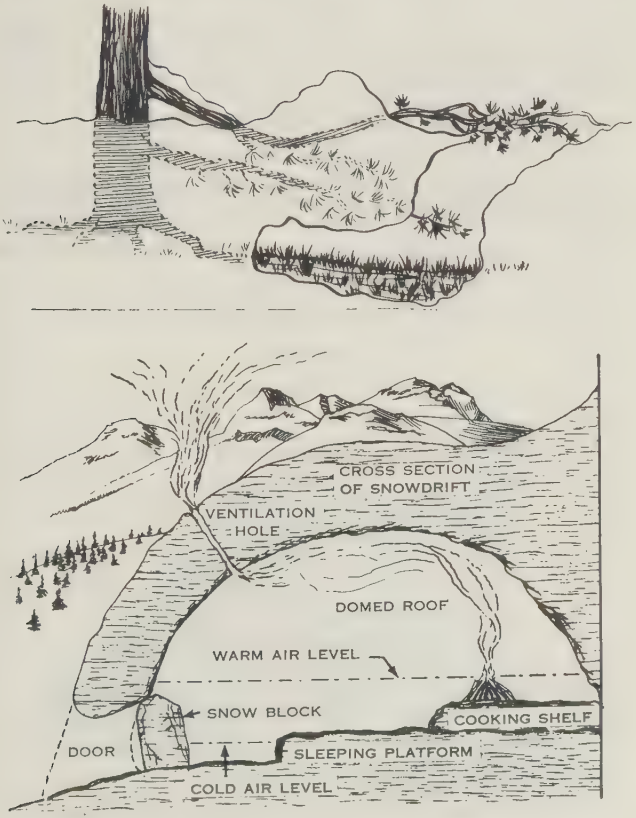

Figure 5–3. Snow caves.

(3) A house built of snow blocks is a useful semi-permanent refuge for two or more survivors. The construction of a snowhouse, however, requires considerable experience and practice. The emplacement of the blocks in this type structure is critical since the blocks are supported by three impinging corners—the two bottom corners and the top (fig. 5–4). The support of three corners, aided by the downward slope of the inclined plane, is the only "mystery" in snowhouse construction. Crevices between blocks are stuffed with triangular pieces of snow and finished off with soft snow gently rubbed in with a mittened hand. The snow functions as a binder and becomes stronger than the original snow blocks. A drawback in constructing this type shelter is the need for tools—knife, saw, or axe. It has been proven by Eskimos that with a knife you survive—without it you need a miracle.

(4) The lean-to is the standard timber shelter (fig. 5–5). When using a lean-to, however, it is important that you be tactically located where you can build a fire large enough to spread warmth equally throughout the shelter. The proper placing of the lean-to and fire in relation to prevailing winds is another consideration. This shelter can be improved by the use of a fire and reflector (fig. 5–6), which is built of green logs and placed on the opposite side of the fire from the opening of the lean-to. Large stones stacked behind the fire also reflect heat.

(5) The parateepee is a tent made from a parachute. It is easily built and especially suited for protection against damp weather and insects. It is possible to cook, eat, sleep, rest, and make signals

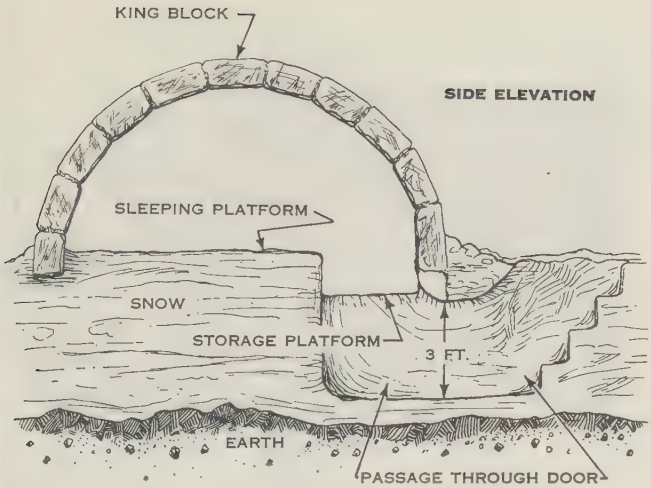

Figure 5–4. Snow houses.

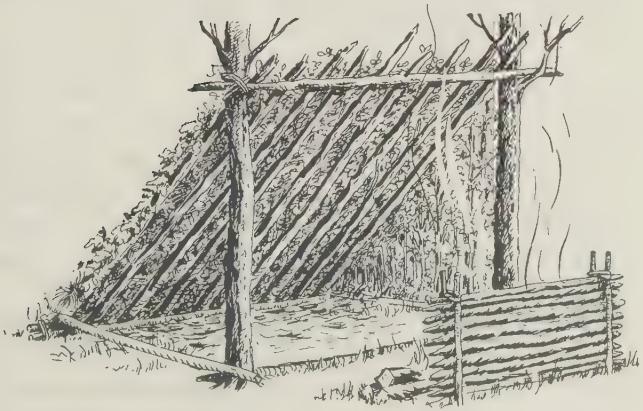

Figure 5–5. Method of pitching lean-to.

Figure 5–6. Firebase and reflector.

without having to go outside. A number of good poles about 12 to 14 feet long are required for parateepee construction (fig. 5–7).

(6) A satisfactory shelter can be made by tying willow trees together to form a framework which can be covered by fabric. There is no particular design for this type of shelter, but it should be large enough for one man and his equipment. Place the open end of the willow shelter at right angles to prevailing winds. Pack the edges of the cover down with snow to prevent wind from blowing under it (fig. 5–8).

(7) Shelters made of boughs do not reflect the heat of a fire and become very undesirable during a rain. But boughs may serve as suitable temporary shelter (fig. 5–9).

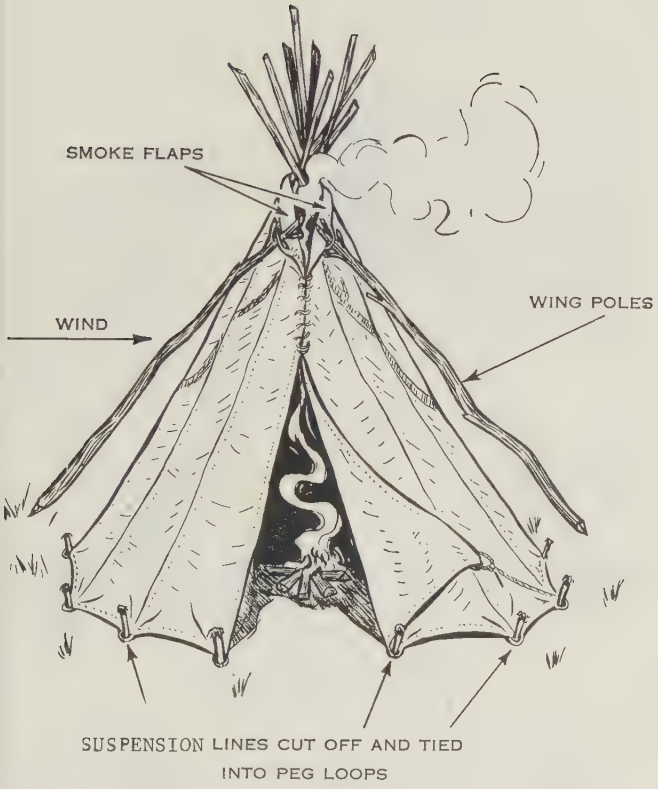

Figure 5–7. Parateepee.

(8) A log shelter is quickly and easily built. Place two poles on a large log, and cover the frame with foliage (fig. 5–10). This shelter is not suitable as a permanent type shelter.

d. Beds.

(1) When you complete the shelter, build a

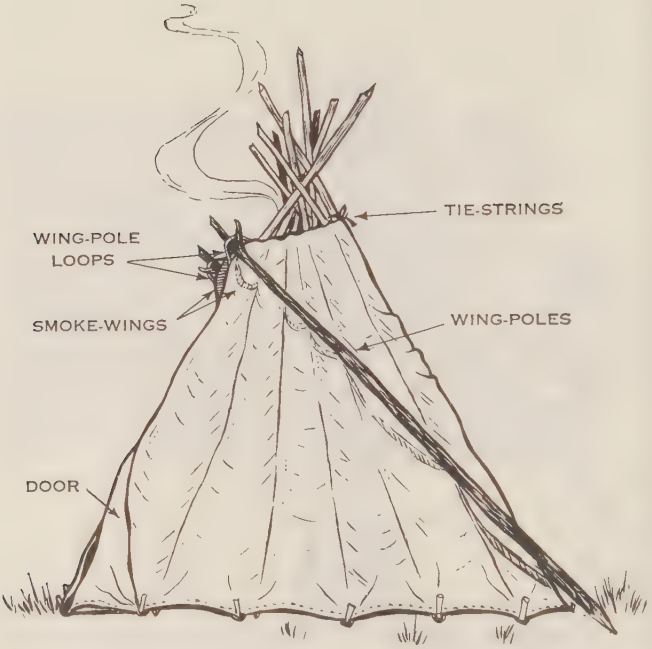

Figure 5–7—Continued.

comfortable bed. Make it so that you will be insulated against the cold damp ground. First warm and dry the ground by building a fire over the bed area, and then stamp the hot coals into the ground. If a parachute is available, spread it over a bed of leaves. A parachute may also be used as a hammock.

(2) Build a bed of boughs by inserting the branches in the ground with the tips slanted in the same direction. Place them about eight inches apart. Cover the boughs with fine, branch tips.

Figure 5–8. Willow shelter.

Figure 5–9. Bough shelter.

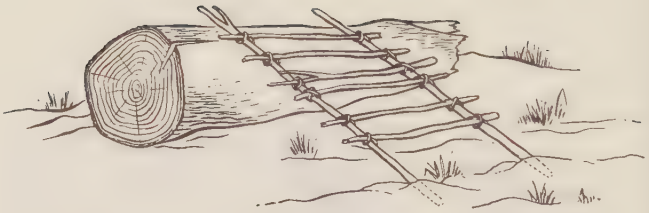

Figure 5–10. Log shelter.

5–5. Water

a. Thirst is a problem in cold regions during the winter. In order to conserve fuel for other purposes, the survivor often deprives himself of drinking water which might have been obtained by melting ice or snow. The time and energy required to chop and gather ice for water also tends to limit the supply. A survivor may become dangerously dehydrated in cold arctic regions just as easily as in hot desert areas.

b. Water can be obtained by cutting a hole in the ice or by melting ice. Approximately 50 percent more fuel and time are required to obtain a given amount of water from snow than from ice.

c. It is safe within limits to eat snow, but observe these precautions:

(1) Allow snow to thaw sufficiently to be molded into a long "stick" or "ball." Do not eat snow in its natural state—it will cause dehydration instead of relieving thirst.

(2) Do not eat crushed ice as it may cause injury to the lips and tongue.

(3) If you are hot, cold, or tired, eating snow will tend to chill the body.

d. There are many ponds, lakes, and streams from which to obtain water during the summer. Depressions on icebergs and floes contain fresh water during the warmer months, as do some protected coves and inlets where water from melting snow has accumulated. But all water, regardless of its source, should be boiled or treated by chemical means, if practicable. Untreated river water is dangerous. Pond water, although brownish in tint, is usually drinkable. The milky water of a glacial stream can be drunk after sediment is strained out or allowed to settle. Old sea ice, recognized by its bluish color and rounded corners, is drinkable. New sea ice is too salty.

e. Any surface that absorbs the sun's heat can be used to melt ice and snow—a flat rock, dark tarpaulin, or signal panel. Arrange the surface so that the water drains into a hollow or container.

5–6. Food

a. Availability. The chances of finding different types of food vary in the arctic, depending on the time of year and the place. Arctic shores normally are scraped clean of all animals and plants by winter ice; but north of the timber-line, even when such foods as mice, fish, and grubs are not available, enough food can still be found to keep you alive.

b. Storage and Preservation.

(1) If a large animal is killed or an abundance of smaller game is found, you should store or preserve some of the meat for future use. During cold

weather, freezing fresh meat or fish preserves it. Freeze the meat as quickly as possible by spreading it around outside your shelter.

(2) During summer months, meat and game should be kept in a cool shady place. A hole in the ground will substitute as a refrigerator. Cure meat by hanging it in strips in trees where the wind and sun can reach it (para 4–7). Meat should be hung at least 15 feet from the ground to be out of the range of flies.

(3) In some areas it may be necessary to protect your supplies from small animals. This can be accomplished by hanging the supplies about six feet above the ground or by using wilderness caches (fig. 5–11).

c. Fish. There are few poisonous fish in arctic waters. But some fish, like the sculpin, lay poisonous eggs; the black mussel may be poisonous at any season, and its poison is as dangerous as strychnine. Also avoid arctic shark meat. In coastal streams and rivers, salmon moving upstream to spawn may be plentiful, but their flesh deteriorates as they travel away from the sea, making them unfit to eat except as a last resort.

(1) In the North Pacific and North Atlantic, extending northward into the Arctic Sea, the coastal waters are rich in all sea foods. Grayling, trout, white fish, and ling are common to the lakes, ponds, and the Arctic coastal plains of North America and Asia. Many larger rivers contain salmon and sturgeon. River snails or fresh water periwinkles are plentiful in the rivers, streams, and lakes of north-

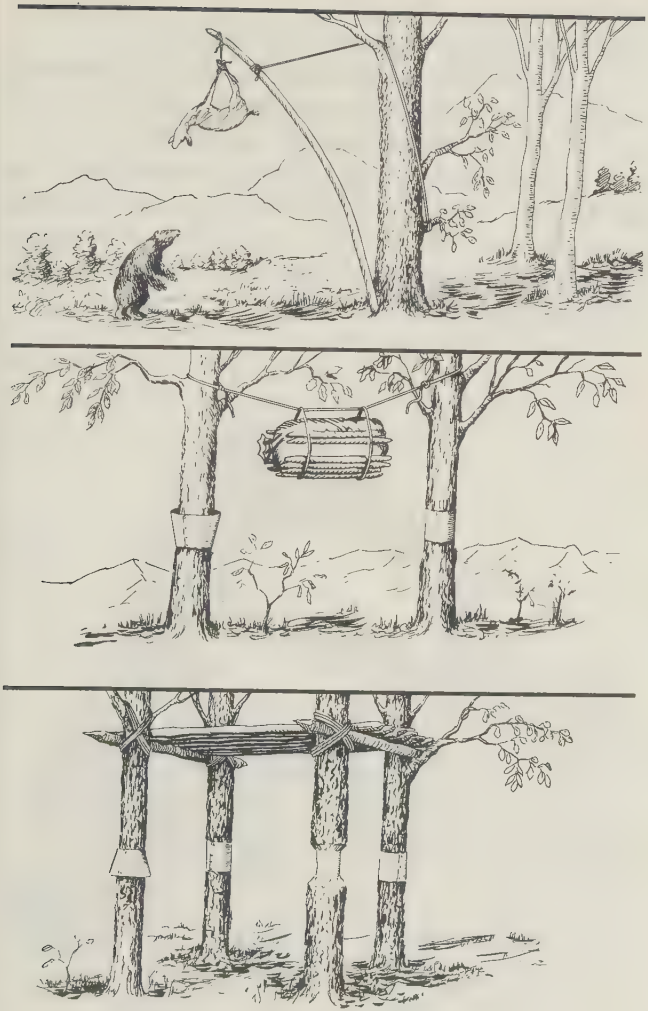

Figure 5–11. Wilderness caches.

ern coniferous forests. These snails may be pencil-point or globular in shape (fig. 5–12).

(2) Fish can be speared, shot, netted, hooked, caught by hand, or stunned by rock or club.

(*a*) Improvised hooks (para 3–7).

(*b*) Pieces of meat, insects, or minnows can be used for bait. Some northern fish nibble at any small object that hits the water. Cod swim up to investigate strips of cloth or bits of metal or bone. Cod may be caught through a hole in the ice.

Figure 5–12. Periwinkle.

(3) A good net can be made out of stout twine or from the inner strands of parachute suspension lines. For the full-grown salmon trout, the meshes should be about two inches square. A scoop net with very fine mesh is required for smaller fish. This can be made out of a pliable willow branch and netting or twine.

(4) Fish can be netted or clubbed more easily in a narrow part of the stream. You can narrow a shallow stream by building a fence of stones, stakes, or brush from either bank.

(5) Fish are sometimes left stranded when a stream is diverted. This method may be very successful (fig. 5–13).

Figure 5–13. Diverting a stream.

(6) To strand fish when the tide goes out, pile up a crescent of boulders on the tidal flats, scooping out the area inside.

d. Land Animals.

(1) *Large land game.* Deer, caribou, wild reindeer, musk ox, moose, elk, mountain sheep, goat, and bear are found in arctic and subarctic regions.

(2) *Small land game.* Tundra animals that are found during winter and summer include, among others, rabbits, mice, lemming, ground squirrel, and fox. Ground squirrels and marmots hibernate in the winter; during the summer, squirrels are abundant along sandy banks of large streams. Marmots, much like our woodchucks, are found in the mountains among rocks, usually near the edge of meadows. Farther south, where there are trees, the porcupine is often encountered and can be easily shaken from a tree and clubbed. This animal feeds on bark. Tree limbs stripped bare are good signs of its presence. Pick up a porcupine only after it is dead.

(3) *Hunting hints.* Hunting is generally better during the early morning and late evening when the animals are moving to and from feeding and bedding grounds and water. *Use ammunition on large game.* Large animals in the arctic are fairly easy to stalk and kill, and they supply much food and fuel. Their skins are also very useful. To successfully hunt land game, you should know some of their characteristics.

(*a*) Caribou or reindeer may be very curious. It is possible to attract them near enough for a shot by waving a cloth and moving slowly toward them on all fours.

(*b*) The technique of imitating a four-legged animal may also cause a wolf to come closer to a hunter.

(*c*) Moose may be found in heavy brush; they may charge. In the winter, they can be spotted by climbing a hill or tree and looking for the animal's "smoke" (condensed body vapor which rises like the smoke of a small campfire).

(*d*) Mountain goat and sheep are wary and hard to approach. They can be surprised, however, by moving quietly downwind while they are feeding with their heads lowered. Stay on higher ground than they are.

(*e*) Musk ox leave cattle-like tracks and droppings. When alarmed, they group together and remain in that position unless approached; then one or more bulls may charge.

(*f*) Bears can be surly and dangerous. A wounded bear is extremely dangerous and should not be followed into cover. The polar bear is a tireless, clever hunter with good sight and an extraordinary sense of smell.

(*g*) Rabbits often run in circles and return to the same place when they are frightened. If the animal is running, whistle. It may stop. Snares are efficient for catching smaller land game (par 3-10).

e. Sea Animals. During winter and spring, sea mammals—seals, walruses, and polar bears—are found on the frozen pack ice and on floes in open water. Like land animals, these sea animals supply food, implements, fuel, and clothing.

(1) Seals are hard to approach but can be

stalked. Keep downwind and avoid sudden moves. A white camouflage suit helps. Advance only when the animal's head indicates that it is sleeping. If a bearded seal appears to move, stand up quickly and shout; the seal may become frightened and lie still, allowing you to shoot or spear it. The bearded seal stays on floe ice. The seal is found in numbers where ice is broken by current holes and tidewater cracks. Do not eat the liver of the bearded seal; its high vitamin A content may cause illness.

(2) The walrus comes up to breathe, but it is harder to locate than the seal because it does not scratch breathing holes in the ice. Walruses are found on floe ice, and generally must be approached by boat. They are probably one of the most dangerous animals of the arctic.

(3) Polar bears are found in practically all arctic coastal regions but they rarely appear on land. Avoid them if possible; but if it is necessary to kill one for food, do not eat the liver. It is dangerous because of its high concentration of vitamin A. *Never eat polar bear meat unless it is cooked.* It is always diseased.

f. Birds.

(1) *General.* The breeding grounds of many birds are in the arctic. Ducks, geese, loons, and swans build their nests near ponds on the coastal plains during the summer, and they provide an abundant source of food. Grouse and ptarmigan (fig. 5–14) mostly inhabit mountainous terrain and brush-covered areas in arctic and subarctic regions. Sea birds may be found on cliffs or small islands on the coast. Their nesting areas often can be located by

their flights to and from feeding grounds. Sea birds, as well as ravens and owls, are useful for food.

(*a*) In winter, owls, ravens, and ptarmigans are the only birds available. Rock ptarmigans are

Figure 5–14. Ptarmigan.

easily approached, travel in pairs, and are very tame. Although hard to locate because of their protective coloring, they provide a good source of food because they can be killed with stones, slingshot, or even a club. Willow ptarmigans which gather in large flocks are easily snared. They are found among willow clumps in bottom lands.

(*b*) All arctic birds go through a 2- to 3-week flightless period in the summer while they are moulting. When birds are moulting, they can be run down. Fresh eggs are among the safest of foods, and *they are edible at any stage of embryo development.*

(2) *Bird traps.* Birds may be caught in a variety of ways—netted with an improvised net made from cord, with a baited hook attached to a fishing line, by a simple trap, or, in the case of half-grown birds, by hand.

g. Plant Foods.

(1) Most plants in polar regions are edible. The water hemlock (fig. 5–15) is, in most cases, the only seriously poisonous plant, but buttercups and some mushrooms should be avoided. *The water hemlock is one of the world's most poisonous plants.* It can be distinguished by where it grows (always in wet ground) and by the following characteristics—a hollow, partitioned bulb at the base of the hollow stem, spindle shaped roots, and a strong disagreeable odor which is especially noticeable in the root and bulb. It is especially abundant in marshes near southern beaches and around marshy lakes in interior river valleys. It is never found on hillsides or dry ground.

(2) Some of the more common edible plants include—

(*a*) *Lichens.* Lichens have possibly the greatest food value of all arctic plants. Some lichens contain a bitter acid that may cause nausea and severe internal irritation if eaten raw. Soaking and boiling the plants in water removes the acid. Lichens can be prepared as a powder by soaking them overnight and allowing them to dry. They can be made crisp by roasting them slowly in a pan. Pound the dried lichen with stone and soak the lichen powder for a few hours. Then boil it until it forms a jelly. Use

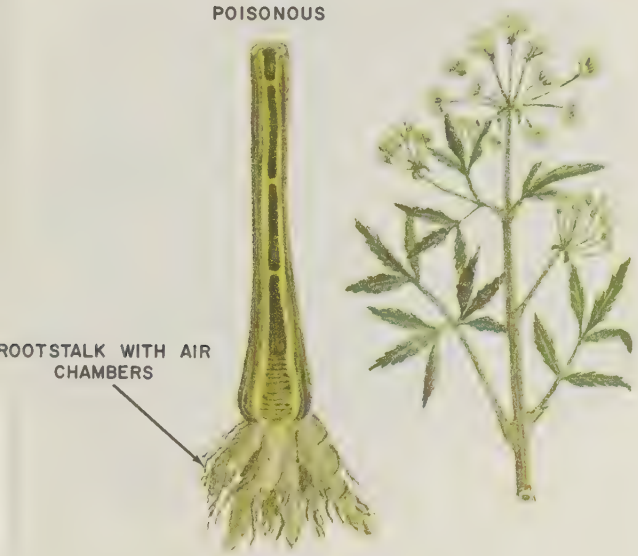

Figure 5–15. Water hemlock.

this to thicken soups and stew vegetables. Rock tripe consists of thin, leathery, irregular shaped discs, one to several inches across. It is black, brown, or grayish. The discs are attached to rocks by a short central stalk. This type lichen is soft when wet, hard and brittle when dry (fig. 5–16 and fig. 5–17).

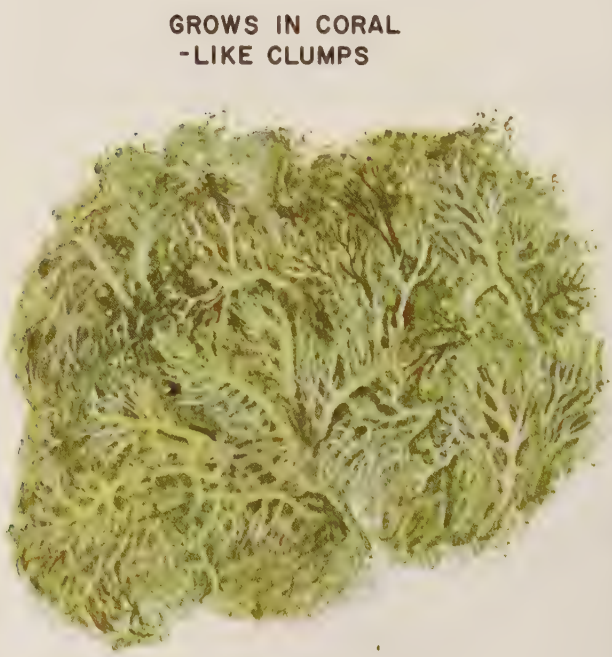

Figure 5–16. Reindeer moss (lichen).

(*b*) *Berries.* The salmonberry is the most important of the northern berries. All berries except the baneberry are edible (fig. 5–18).

1. Baneberry. This berry is poisonous (fig. 5–19).

2. Mountain berry. A low creeping shrub with leathery evergreen leaves. It has red berries which are high in vitamin content (fig. 5–20).

3. Alpine bearberry. This berry grows on a trailing shrub with shreddy bark and rounded leaves that turn red and are almost tasteless. Dry and shred the leaves to make a fairly good tobacco substitute (fig. 5–21).

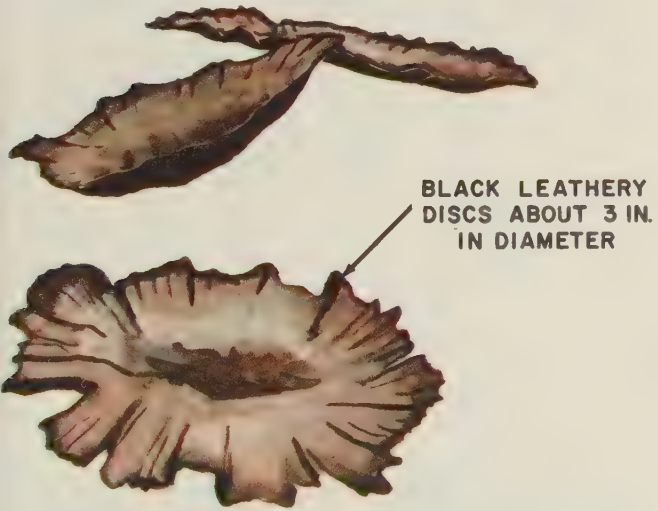

Figure 5–17. Rock tripe (lichen).

Figure 5–18. Salmon berry.

4. *Wild Rose.* Fruit, called "hips," is available from midsummer through fall (often winter and early spring). The wild rose is found in dry woods, especially along streams and bluffs. It is

Figure 5–19. Baneberry.

distinguished by its prickly shrub. Hips are red to orange. In spring and winter, rose hips are hard and dry but still edible and highly nutritious (fig. 5–22).

5. Other berries which can be eaten are the

Figure 5–20. Mountain berry.

cloudberry and the crowberry (fig. 5–23 and 5–24).

(*c*) *Roots.* The following roots are edible:

1. Sweet vetch. This plant supplies the licorice root which is edible raw or cooked. The

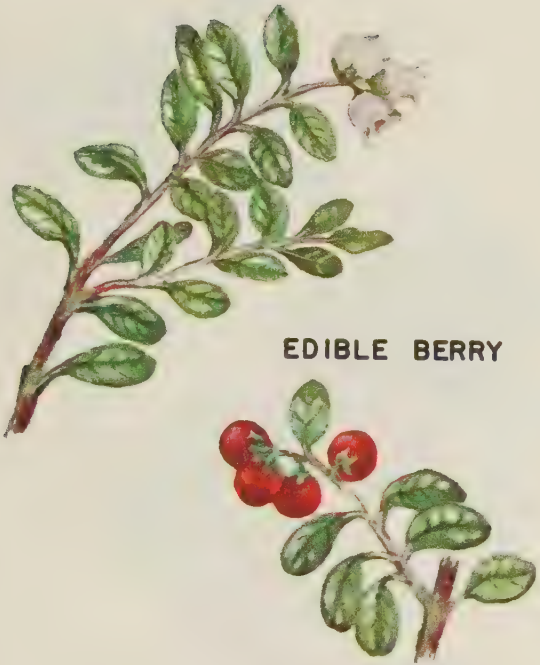

Figure 5–21. Alpine bearberry.

plant itself is common in the north and can be found in sandy soil, especially along lake shores and streams. It has pink flowers. The cooked roots taste like carrots but are even more nourishing (fig. 5–25).

2. Wooly lousewort. This is a low plant with wooly spikes or rose-colored flowers. The sul-

Figure 5–22. Wild rose.

phur yellow root is a large, sweet root and is edible either cooked or raw. It is found on dry tundra regions of North America (fig. 5–26).

Figure 5–23. Cloudberry.

3. Bistort or knotweed. This root is also found on the tundra. It has white or pink flowers which form a slender spike. The elongated leaves are smooth edged and come out of the stem near the soil level. The root is rich in starch but tastes slightly acid when eaten raw. It is best when soaked in water for a few hours and then roasted (fig. 5–27).

4. Licorice root. This root and the Eskimo potato (fig. 5–28) have root-like tubers available in

Figure 5–24. Crowberry.

early spring, summer, and fall (occasionally winter). They become stringy and inedible in summer. The flowers of this plant are pink-purple, pea-like, and grow in elongated clusters, seed pods are flat, 1 to 2 inches long, and formed of several roundish joints.

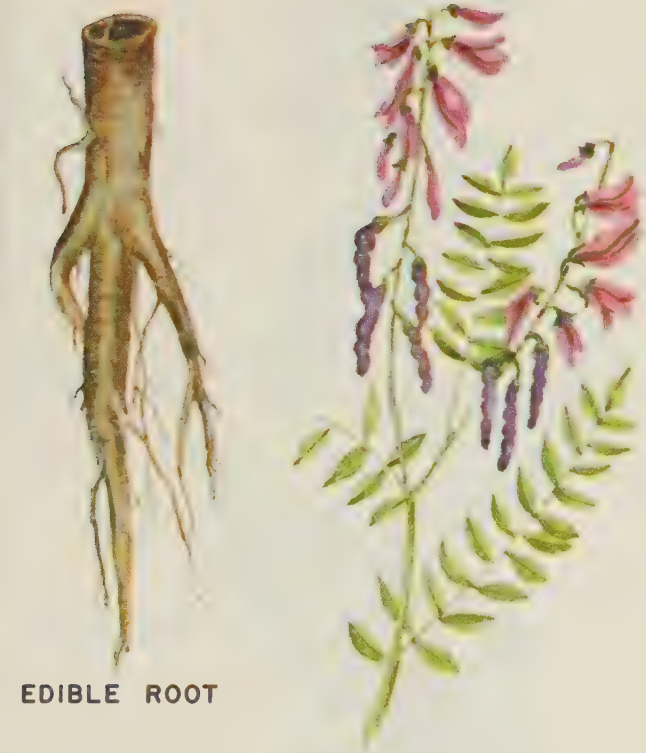

Figure 5–25. Sweet vetch.

(*d*) *Antiscurvy plants.* Scurvy can be prevented by eating fresh plants and meat. Many plants high in vitamin C content may be found, among

Figure 5–26. Wooly lousewort.

Figure 5–27. Bistort.

Figure 5–28. Licorice roots.

which are scurvy grass (fig. 5–29) and spruce (fig. 5–30).

(*e*) *Greens.* Many northern plants are good substitutes for the leafy vegetables normally eaten as part of your everyday diet.

Figure 5–29. Scurvy grass.

1. *Wild rhubarb.* See paragraph 3–4.

2. *Dandelion.* This plant is a potential life-saver in polar regions (fig. 5–31). Both leaves and roots can be eaten raw, but they taste better after

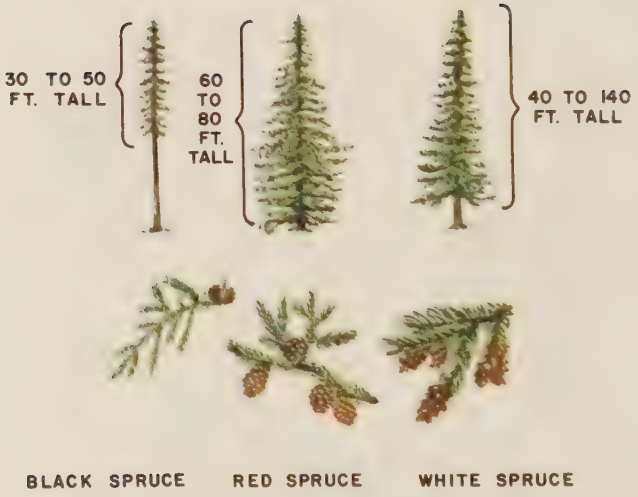

Figure 5–30. Spruce.

light cooking. Dandelion roots can be used as a coffee substitute. To prepare them, clean the roots, split them, and cut them into small pieces. Roast them and grind the roasted roots between two stones. Brew like coffee.

3. Marsh marigold. This plant is found in swamps and along streams and comes out early in the spring. The leaves and stems, particularly those of young plants, are tasty when cooked (fig. 5–32).

4. Seaweed. These are a good supplement to a fish diet (para 3–7).

5. Willow. These shrubs or small trees are

Figure 5–31. Dandelion.

Figure 5–32. Marsh marigold.

found throughout Alaska. On the tundra, they may be only a few inches high. They have young, tender, leafy shoots that are edible during the spring. They

Figure 5–33. Willow.

become bitter and tough when old. Willows can be identified by their flower or fruit clusters that develop into caterpillar-like spikes an inch or so long. They are found in almost all habitats and are one of the richest sources of vitamin C (fig. 5–33).

6. Dwarf fireweed (Rock Rose). The young leaves, stems, and flowers are edible in spring, be-

Figure 5–34. Dwarf fireweed.

come tough and bitter in summer, and die in the fall. They are found along streams, sandbars, lake shores, and on Alpine and Arctic slopes. The stems are 1 to 2 feet tall and the leaves are thick, almost white, and about 3 inches long. The flowers are rose to purple, large and showy, with four petals (fig. 5–34).

7. Tall fireweed. The young leaves, stems, and flowers are edible in spring, becoming tough and bitter in summer. This plant is found in open woods, on hillsides and stream banks, and near sea beaches. It is especially abundant in burned-over areas. It is similar to the dwarf fireweed, but its leaves are green and its stems are reddish and taller than the dwarf fireweed. It grows up to 6 feet tall; its flowers are showy pink (fig. 5–35).

8. Coltsfoot. The leaves and flowering shoots are edible in spring and summer. The plant is found in moist woods and wet tundra. It has thickish leaves, is triangular in outline, and grows 3 to 10 inches long. It is dark green above and fuzzy white below, and rises from the ground only in the spring. The stalk is fleshy and cobwebby, about a foot high with a cluster of creamy flowers at the top (fig. 5–36).

5–7. Firemaking

a. Selecting a Site. Select a site which affords protection from the wind. Standing timber or brush makes a good windbreak in wooded areas, but in open country protection will have to be provided. A row of snow blocks, the shelter of a ridge, or a scooped-out side of a snowdrift will serve as a wind-

Figure 5–35. Tall fireweed.

break on the ice pack. A circular wall of brush, cut and stuck in the snow or ground, works well in willow country. A ring of evergreen boughs is good in timber country. Make the windbreak about four feet high and, except for an entrance, let it encircle

Figure 5–36. Coltsfoot.

the fire. Protect the fire from snow melting on overhanging tree limbs.

b. Fuel.

(1) Anything that burns is good fuel, and many kinds are available in the far north: animal

blubber, lichens, exposed lumps of coal, driftwood, grass, and birch bark. In some parts of the Arctic, however, the only fuel may be animal fats, which can be burned in a metal container by using a wick to ignite the fat. Seal blubber makes a satisfactory fire without a container if gasoline or heat tablets are available to provide an initial hot flame. A square foot of blubber will burn for several hours. Burned blubber cinders are edible. Eskimos burn seal blubber using seal bones as the wick. First, they make a little pyramidal pile of bones; then they saturate a small rag with oil from a piece of blubber, light the rag, place it inside the bone pile, and lay the blubber carefully on top of the pile. The heat melts the oil from the piece of blubber, and the oil drips on to the heated bones and ignites. A blubber stove can be made from an empty tin can about the size of a one-pound coffee tin. First, punch the tin (including the bottom) full of small holes. Then build a wick from a piece of canvas, dry tundra moss, or a piece of sealskin with the hair side up. The wick is impregnated with the oil, lighted, and placed under the tin can, and blubber is placed on top of the tin can. The oil dripping from the blubber into the heated air inside the can will burn hotter than it does when blubber is placed directly on a wick without a tin can.

(2) Fuel in subpolar regions is usually wood. The driest wood is found in dead standing trees. In living trees, branches above snow level are the driest. In the tundra regions, split green willows and birches into fine pieces and burn them.

c. Cooking (ch 4). Do not fry meat. This method

eliminates the fat necessary for good health in the arctic.

5–8. Clothing

a. The basic survival problem in polar regions is keeping warm. Cold allows no time for trial and error experimentation. *You must do the right thing first.* Your clothing and how it is worn may determine how long you survive.

b. In cold environments, body heat is lost to the surrounding air. Clothes in cold climates then should serve one purpose—to keep the body heat from escaping by insulating it against the cold outside air. Clothing of the normal layer type, put on or removed as needed, helps to control body temperature. The inner layers of insulating clothing hold warm air in, while the wind-resistant outer clothing keeps cold air from penetrating the clothing and carrying heat away.

c. Some important facts about clothing and its relationship to you are:

(1) Tight clothing reduces the zone of still air near the body and prevents free circulation of the blood.

(2) Perspiration is dangerous because it reduces the insulating value of clothing by replacing air with moisture. As the moisture evaporates, it cools the body. Avoid overheating by removing layers of clothing and by opening the clothing at the neck, wrists, and front inclosure.

(3) Hands and feet cool more quickly than other parts of the body and require special care. Keep the hands under cover as much as possible.

They can be warmed by placing them next to the warm flesh under the armpits, between the thighs, or against the ribs. Feet, because they perspire more readily, are difficult to keep warm. You can be comfortable, however, by wearing shoes large enough for you to wear at least two pairs of socks, and by keeping the feet dry. A warm double sock can be made by putting one pair of socks inside another and filling the space between them with a layer of dry grass, moss, or feathers (fig. 5–37).

(4) It may be necessary to improvise some articles of clothing like boots (fig. 5–38), especially if your boots are too small to allow for extra socks.

Figure 5–37. Insulating socks.

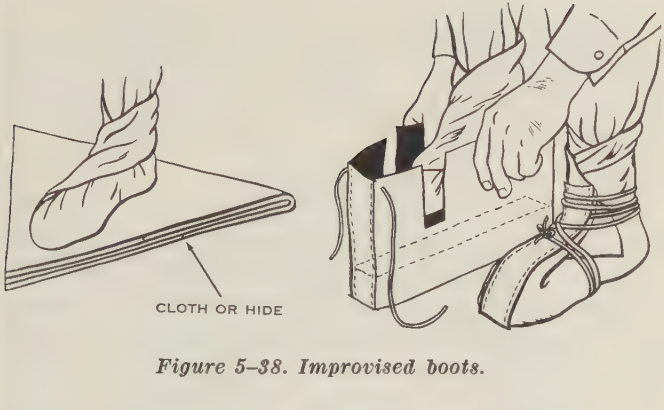

Figure 5–38. Improvised boots.

A piece of canvas and some cord are all you need. The canvas seat of a military vehicle can be used when improvising boots, so can the seat pad cover of a pilot's parachute.

5–9. Health

a. Disease-transmitting insects, poisonous snakes, plants, and animals; and diseases decrease as you move north or south from the equator. Physical hazards such as snow and cold increase. The chief danger to health in the Arctic is freezing. Snow-blindness, carbon monoxide poisoning, and sunburn are secondary dangers (para 2–16).

b. Frostbite is a constant danger to anyone exposed to temperatures below freezing. There is no particular pain to frostbite, and it can occur without your knowing it. The symptoms are stiffness, lack of feeling, and grayish or whitish color of the affected part. Warm the frostbitten area with a warm part of the body, and do not exercise or massage the spot.

Do not apply snow or ice. Frostbite may cause blistering and peeling just as in sunburn. Do not break or open blisters. Check exposed skin often, and if you have a companion, check each other for symptoms of frostbite. To neglect frostbite is to invite gangrene.

c. Insufficient rest and improper diet greatly contribute to the risk of freezing to death. Symptoms of advanced general freezing are muscular weakness, fatigue, stiffness of limbs, and overpowering drowsiness. The victim's sight dims, he staggers, falls, and becomes unconscious. Give the victim something hot to drink. Treat him for shock. Rapidly rewarm any frozen parts of the body by immersion in warm water (90° F–104° F*); by placing a warm hand on the frozen part; or by exposure to warm air. Be especially careful in handling frozen body parts—frozen flesh can be easily damaged. Individuals with cold injuries in the area of the feet or legs should be treated as litter patients.

d. Snow blindness is caused by brilliant reflections or glare from the snow. It can occur even on foggy or cloudy days. The first warning of snow blindness comes when variations in the level of the ground can no longer be detected, followed by a burning sensation of the eyes. Later the eyes hurt when exposed to even a weak light. Prevention is the best cure, but if stricken, complete darkness is the best medicine. Wear sunglasses at all times. If none are available, use a piece of wood, leather, or

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* The temperature is correct if the water does not feel too warm to the back of an *undamaged* hand.

other material with narrow eye slits cut in it (fig. 5–39). Glare is reduced if the nose and cheeks are blackened with soot.

Figure 5–39. Improvised sunglasses.

e. The danger of suffocation by carbon monoxide is a great hazard in the arctic. To one subjected to extreme cold, the desire to get warm and stay warm often overrules common sense. Depend on your clothing to keep you warm—not a fire. In temporary shelters, use fires and heaters only for cooking. Any type fuel burning for as little as a half hour in a poorly ventilated shelter can produce a dangerous amount of odorless carbon monoxide fumes. Ventilation can be provided by leaving the top of the shelter open, providing another opening (for fresh air) close to the ground (door flap partially open), or by building a draft tunnel. The tunnel is buried in the floor and has an opening under the stove. The draft of the stove draws fresh air from the outside of the tent into the tunnel. If you are in a shelter and begin to feel drowsy, get into fresh air. Move slowly and breathe evenly. Above all, remove the source of the fumes. If several men are sleeping in a closed, heated shelter, one man should stay awake to watch for indications of carbon monoxide.

f. Use a tourniquet only to control severe bleeding from an arm or leg. When elevation and a pressure dressing over the wound fail to control bleeding (or when blood is spurting from a wound), apply a tourniquet immediately. Once applied, the tourniquet must be left on, despite the probable loss of a limb due to freezing, since no replacement for lost blood will be available; it is better to lose a limb than to lose a life. Wounds which do not require a tourniquet should be bandaged only tightly enough to check the bleeding, and loosened when bleeding has been controlled. Keep the body and

affected limb(s) comfortably warm at all times, but do not overheat.

g. Arctic sunburn is possible on both cloudy and sunny days, and it should be considered a dangerous possibility. Animal tallow rubbed on the skin helps to prevent sunburn. A face mask similar to that used to prevent frostbite is also effective. A stubby beard also protects against sunburn. If sunburned, keep the affected parts moist with animal oils, and stay out of the sun.

h. In the arctic, just as in other areas, good care of the body is essential. Try to keep clean. If body washing is not possible, at least try to keep the face, hands, armpits, crotch, and feet clean by wiping them with a cloth. Every night before going to sleep, remove the boots, dry the feet, and rub and massage them. Make provisions for drying the boots by holding them over a camp fire. Do not sleep in wet socks. Put them inside the shirt next to the body to dry. If you have no fire and if the shoes are wet when you go to bed, stuff them with dry grass or moss in order to speed drying.

i. Do not be afraid to expose the body when disposing of body wastes. The areas exposed will not stay exposed long enough to hurt you. Bury the garbage and body wastes at a distance from your shelter and water supply.

5–10. Natives

There are relatively few natives in the arctic. Those found in North America and Greenland are friendly. Eskimos live mostly along the coasts. In-

dians are found along rivers and streams of the interior. Arctic natives, like yourself, have little enough to eat, so do not take advantage of their hospitality. Offer payment when leaving.

CHAPTER 6

SURVIVAL IN TROPICAL AREAS

6–1. Know the Jungle

a. There is no standard jungle. A "primary" jungle is easily recognized by its abundance of giant trees. The tops of these trees form a dense canopy more than 100 feet from the ground. Under this canopy, there is little light or underbrush. Land in this type jungle is difficult but not impossible to traverse.

b. Primary jungle growth has been cleared in many areas of the world to allow for cultivation. This land, when cleared and left idle, is reclaimed by jungle growth; it then becomes a sea of dense underbrush and creepers. This is "secondary" jungle and is much harder to traverse than primary jungle.

c. Well over half the land in the tropics is cultivated in some way or another, primarily in connection with rubber, tea, and coconut plantations, and native allotments. If in a plantation area, watch for the men who tend the crop—they may offer aid.

d. The tropical rain jungle, whether secondary or primary, is an unpleasant land to live in and travel through.

e. Dry scrub country is more open than the wet jungle but is difficult to travel through because of its lack of topographical features, population, and tracks. It can be traversed, however, by using a compass, patience, and common sense.

6–2. Travel

Travel can be conducted safely in the jungle if you do not panic. If alone in the jungle, depending on the circumstances, the first move is to relax and think the problem out. You should—

a. Pinpoint your position as accurately as possible to determine a general line of travel to safety. If a compass is not available, use the sun in connection with a watch as an aid to direction (para 2–5).

b. Take stock of water supply and rations.

c. Move in one direction but not in a straight line. Avoid obstacles; do not fight them. In enemy territory, take advantage of natural cover and concealment.

d. There is a technique for moving through jungle; blundering only leads to bruises and scratches. Turn the shoulders, shift the hips, bend the body, and shorten or lengthen, slow or quicken your pace as required.

6–3. Shelter

a. Selecting a Site.

(1) Try to pick a camp site on a knob or high spot of ground in an open place well back from swamps. Mosquitoes will be less bothersome, the ground will be drier, and breezes are more likely.

(2) In mountainous jungle, the nights are cold. Get out of the wind.

(3) Avoid dry riverbeds—they can be flooded in a few hours, sometimes by rains so distant from you that you are not aware that any rain has fallen.

b. Types of Shelter. The type of shelter built depends on the time available for preparing it and whether it is to serve as a permanent or semipermanent structure. Some jungle shelters are—

(1) Simple parachute shelter made by draping a parachute over a rope or vine stretched between two trees.

(2) Thatch shelter made by covering an **A**-type framework (fig. 6–1) with a good thickness of palm or other wood leaves, pieces of bark, or mats of grass. Slant the thatch shingle-fashion from the bottom upward. This type of shelter is considered ideal since it can be made completely waterproof. Use the broad leaves of young banana trees. Build a hot fire on a flat stone or on a platform of small stones. When the stones are well heated, place a leaf on them and allow it to turn dark and glossy. At this stage, the leaf is more water repellent and durable and can be used as a shingle. After the shelter is finished, dig a small drainage ditch leading downhill; it will keep the floor dry.

c. Beds. Do not sleep on the ground; make yourself a bed of bamboo or small branches covered with palm leaves (fig. 6–2). A parachute hammock may serve the purpose. You can make a crude cover from tree branches or ferns; the bark from a dead tree is better than nothing.

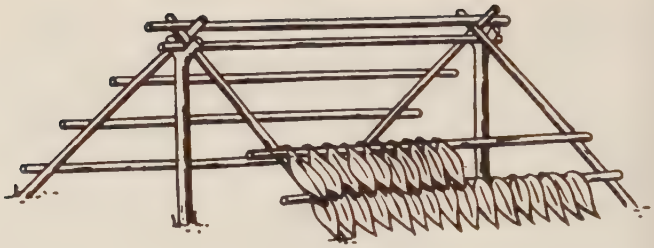

Figure 6–1. **A**-*type framework.*

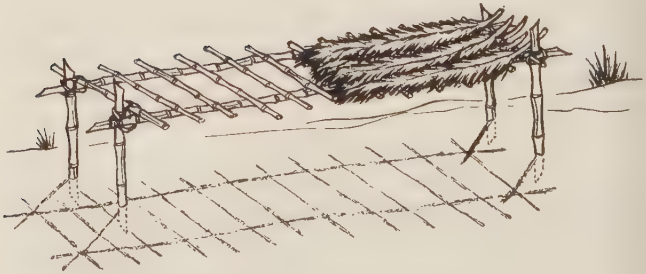

Figure 6–2. Bamboo bed.

6–4. Water

a. Finding water in jungle country is usually not difficult. Use these hints:

(1) The water from clear, swift-flowing streams containing boulders is a good source for drinking and bathing, except in those areas where schistosomiasis is known to be present. Before drinking water, make it potable by boiling or by chemical means.

(2) Water that is almost clear can be obtained from muddy streams or lakes by digging a hole on the land 1 to 6 feet from the bank. Allow the water to seep in and the mud to settle.

(3) Water from tropical streams, pools, springs, and swamps is safe to drink only after it has been made potable.

(4) Water can be obtained from vines and plants. Bamboo stems and vines are good sources of water (para 3–17).

b. Coconuts, particularly when green, supply milk which is both pleasant and nourishing when consumed in small quantities (para 3–17*c*(3)(*a*)). A sugary sap can be obtained by cutting the flower spikes. Coconuts are available throughout the year. A drinkable sugary sap can also be obtained from the buri, nipa, sugar, and other palm trees (para 3–17).

6–5. Food

a. Abundance. There is an abundance of food in the jungle, but some is poisonous (para 3–4). Any food eaten by a monkey is generally safe for human consumption. In many inhabited areas of the tropics

cultivated fruits and vegetables and other foods are fertilized with human waste and are a source of infection. Never eat these fruits and vegetables raw unless you have peeled them or completely cut off the outer surface with a knife. Cook all vegetables before eating them.

b. Fish. There are some poisonous fish in tropical waters, but many species are edible. The safest fish to eat are those from the open sea or deep water beyond the reef. The enterprising survivor can sustain himself along the beach by eating shellfish, snails, snakes, lobsters, sea urchins, and small octopuses. Suckers abound in most tropical streams.

(1) Eat only small portions of any fish. If no ill effects occur, it is safe to continue eating.

(2) Tropical fish spoil quickly and should be eaten soon after they are caught. *Never eat entrails or eggs of any tropical fish.*

(3) Common fishing methods are likely to prove successful in the jungle.

c. Plants. Some plants that are poisonous and should be avoided are:

(1) *White mangrove or blind-your-eye.* This plant is found in mangrove swamps, estuaries, or on coasts. Sap causes blistering on contact. *It will blind you if it contacts your eyes.* (fig. 6–3).

(2) *Cowhage or cowitch.* This plant is usually found in thickets and brush country but never in true forest. The hairs of the flowers and pods cause irritation. Blindness results if they contact the eyes (fig. 6–4).

(3) *Nettle trees.* This plant is widespread, espe-

cially in and near ponds. It is poisonous to touch and causes a burning sensation (fig. 6–5).

(4) *Thorn apple or jimson weed.* This a common weed of waste and cultivated land. All parts

Figure 6–3. White mangrove.

of this plant, especially the seeds, are poisonous (fig. 6–6).

(5) *Pangi.* This plant is found mainly in the Malayan jungle. Its seeds contain prussic acid. It

Figure 6–4. Cowhage or cowitch.

is dangerous when eaten raw, but edible when roasted (fig. 6–7.)

(6) *Physic nut.* The seeds of the physic plant act as a violent laxative (fig. 6–8).

(7) *Castor oil plant.* This is a shrublike plant common in thickets and open sites; it has seeds

Figure 6–5. Nettle tree.

which are poisonous and act as a violent laxative (fig. 6–9).

(8) *Strychnine.* These plants grow wild throughout the tropics. The luscious-looking white

Figure 6–6. Thorn apple.

or yellow fruit (about the size and shape of a small orange) is abundant in Southeastern Asia. The fruit has an exceedingly bitter pulp, and the seeds contain a powerful poison (fig. 6–10).

6–6. Firemaking and Cooking

See chapter 4.

Figure 6–7. Pangi.

6–7. Clothing

Unless completely covered, the body is vulnerable to leeches, insects, scratches, bruises, and cuts. You should have—

a. Clothing loose enough to be tucked into gloves and socks.

Figure 6–8. Physic nut.

b. Clothing strong enough to withstand hard wear.

c. Mosquito headnets and thorn-resisting gloves.

d. Pockets for carrying emergency items such as maps, compass, and matches.

e. Army issued jungle boots are the best for jungle footwear.

Figure 6–9. Castor oil plant.

6–8. Health

a. General. Do not expect to elude the enemy and remain alive in the jungle areas unless you keep your body strong. Even under ideal conditions, this is difficult, but the chances are increased by some common sense rules.

Figure 6–10. Strychnine.

(1) Do not hurry. Never try to beat the jungle by speed—it is not possible.

(2) Avoid climbing high terrain except for taking bearings. A long detour over flat ground is preferable.

(3) Take care of the feet by changing and washing the socks often. Also, protect your footwear from cracking and rotting by using grease.

(4) Should fever occur, make no attempt to travel. Wait until the fever abates. Drink plenty of water.

(5) Ticks, leeches, mosquitoes, insects, and other pests (chap 2) constitute a real danger to health and safety. Combat them by using insect repellent or by avoiding areas where they are prevalent.

(6) Avoid infections. In the heat and dampness of the tropics, wounds quickly become infected. Try to protect a wound or sore by covering it with a clean dressing. Sterilize this bandage if possible.

(7) Prevent heat exhaustion, heat cramps, or heat stroke by replacing the water and salt lost through perspiration. Drink plenty of potable water; if you have salt, mix two tablets to a canteen (quart) of water. If you feel the effects of heat, relax in the shade and drink a half canteen of this salted water every 15 minutes. Continue this treatment until you feel better.

(8) Avoid sunburn.

b. Sickness and Fever. Diseases common to tropical areas include—

(1) *Malaria.* See paragraph 2–18.

(2) *Dysentery.* Caused by polluted food or drinking water.

(3) *Sand fly fever.* This has symptoms similar to malaria. Give plenty of water or other liquids by mouth and have the patient rest until his fever abates. If aspirin or "APCs" are available, two tablets every four hours may be given to adults for three to four days.

(4) *Typhus.* There are several types of typhus found in tropical areas among which are the flea-borne, louse-borne, and mite-borne varieties. The general symptoms are severe headaches, weakness, fever, and generalized body aches. The victims usually have a dusky complexion and may or may not develop a pink mottled or splotchy rash. Some untreated forms of typhus have mortality rates up to 40 percent. Strict attention to personal hygiene, avoidance of contact with lice or flea ridden rodents, and avoidance of mite-infested grassy areas is essential. Louse-borne typhus infection of vaccinated adults is mild and may go unrecognized. Keep your inoculations current.

(5) *Dengue fever.* See paragraph 2–18.

(6) *Yellow fever.* See paragraph 2–18.

CHAPTER 7

SURVIVAL IN DESERT AREAS

7–1. Distribution

Those areas called "deserts" vary from salt to sand deserts. Some are barren of plant and animal life; in others there are grasses and thorny bushes where camel, goat, or even sheep can nibble enough to live. Anywhere they are found, deserts are usually places of extremes—extremely hot during the day, extremely cold at night, extremely free of plants, trees, lakes, and rivers. Deserts are found throughout the world and comprise nearly one-fifth of the earth's surface. Among the better known desert areas are the Sahara, Arabian, Gobi, and the flat plains of the southwestern United States.

7–2. Travel

Water is the most important factor in desert survival. Carry all you can, even if something else has to be left behind. When you decide to travel—

a. Travel only in the evening, at night, or early morning.

b. Head for a coast, a known route of travel, a water source, or an inhabited area. Along a coast, perspiration can be conserved by wetting your clothes in the sea.

c. Follow the easiest route possible by avoiding loose sand and rough terrain, and by following trails. In sand dune areas, follow the hard floor valleys between dunes, or travel on dune ridges.

d. Avoid following streams to reach the sea except in coastal desert areas or those areas with large rivers flowing across them. In most deserts, valleys lead to an enclosed basin or temporary lake.

e. Dress properly for protection against direct sunlight and excessive evaporation of perspiration. If sunglasses are not available, make slit goggles (fig. 5–39). Clothing is necessary for warmth on the desert because cool nights are common.

f. Care for the feet. Boots are perfect for desert travel. Cross sand dunes barefooted only in cool weather; otherwise, the sand will burn the feet. Follow caravan trails to avoid encountering loose sand or broken, rocky areas.

g. Check maps for accuracy if possible. Maps of desert regions are usually inaccurate.

h. Take shelter during a sandstorm. Do not try to travel when visibility is bad. Mark directions with a deep scratched arrow on the ground, a row of stones, or anything available. Lie on your side with your back to the wind and sleep through the storm. Cover the face with a cloth. Do not worry about being buried by the sand; even in sand dune areas it takes years for the sand to cover a dead camel. If possible, seek some shelter on the lee of a hill.

i. Multiply estimations of distances by three since the absence of features often makes an underestimate likely.

j. Mirages may appear often during the summer when you are facing the sun, although it is difficult to generalize under what conditions they will occur and what forms they will take.

7–3. Shelter

Shelter from sun and heat and occasional sandstorms is necessary to survive in desert areas. Since materials generally are not available for building a shelter, use these hints—

a. Get some protection from the sun by covering the body with sand. Burrowing in the sand also reduces water loss. Some desert survivors report that the pressure of the sand offers valuable physical relief to tired muscles.

b. If you have a parachute or other suitable cloth, dig out a depression and cover it. In rocky desert areas or where desert shrub, thorn shrub, or tufted grass hummocks grow, drape a parachute or blanket over the rocks or shrubs.

c. Make use of both natural and man-made desert features for shade or shelter—a tree, a rock cairn, or cave. The wall of a dry stream bed may provide shelter; but after a cloudburst, your home may become suddenly flooded. Wadi-banks—along dried riverbeds, valleys, and ravines—are particularly good places to look for caves.

d. Utilize native shelter when practicable. Survivors reported during World War II that even desert tombs were used for protection against the elements.

7–4. Water

a. General. The importance of water cannot be

overemphasized. It is essential, regardless of how adequate your food supply may be. In hot deserts, a minimum of one gallon per day is needed. If perspiration is controlled and travel is accomplished during the cool desert night, you can move about 20 miles on that gallon. During the heat of the day, you might travel 10 miles.

b. Conserve Water.

(1) Keep fully clothed. Clothing helps control perspiration by not letting the perspiration evaporate so fast that you miss some of its cooling effect. You may feel cooler without a shirt, but you perspire more and sunburn is probable.

(2) Do not hurry. You will survive longer on less water if perspiration is kept down.

(3) Do not use water for washing unless you have a sure and lasting supply.

(4) Do not gulp water; drink in small sips. Use water only to moisten the lips if the supply is critical.

(5) Keep small pebbles in the mouth or chew grass as a means of relieving thirst. Prevent water loss by breathing through the nose. Do not talk.

(6) Use salt only with water and only if there is an ample supply of water. Salt causes increased thirst.

(7) Rationing yourself to 1 or 2 quarts of water a day is inviting disaster (at high temperatures) as such amounts do not prevent dehydration (para 7–8). Ration perspiration not water.

c. Locate Wells. A minimum of four quarts of water per day may be difficult to find unless a well or

oasis is nearby. Since wells are the source of most water on the desert, the best way to locate them is to travel along a native trail. There are other ways of locating water in the desert. Use these guides—

(1) Along sandy beaches or desert lakes, dig a hole in the first depression behind the first sand dune. Rain water from local showers collects there. Stop digging when you find damp sand and allow the water to seep in. Deeper digging may produce salt water.

(2) Scoop out a shallow well wherever damp sand is found.

(3) Dry stream beds often have water just below the surface. It sinks at the lowest point on the outside of a bend in the channel as the stream dries up. Dig along these bends for water.

(4) Dew might be a source of water, particularly in some regions. Cool stones or any exposed metal surface will serve as a dew condenser. Wipe off the dew with a piece of cloth and wring it out. Dew evaporates soon after sunrise and should be collected before then.

(5) Look for cisterns or natural tanks that may be located behind rocks, in gullies or side canyons, and under cliff edges. Often the ground near them is solid rock or hard-packed soil. In the absence of such markers, search for the water point by observing animal droppings.

(6) Watch the flight of birds, particularly at sunset and dawn. Birds circle water holes in true desert areas.

(7) In the Gobi desert, do not depend on plants as a source of water. The wild desert gourd may be

considered a water source on the Sahara (para 3–4). The large barrel cactus of the American desert also contains considerable moisture which can be squeezed out of the pulp. This is sometimes a difficult task. The best alternative is a well or another source (para 3–15).

(8) Disregard the romantic stories of poisoned wells. These stories generally originate because of bad tasting water that contains salt, alkali, or magnesium.

(9) Treat all water. This is especially important in native villages and around civilization.

7–5. Food

a. General. Food is difficult to find in the desert. Food, however, is secondary to water, and you may do without it for several days without any ill effects. Ration food from the beginning. Eat nothing during the first 24 hours, and do not eat unless you have water.

b. Natural Sources.

(1) Animals are rare in the desert. Rats and lizards may be found near a water hole, and they may be your only diet. Deer-like animals are sometimes found in open desert country, but they are difficult to approach. The most common desert animals are small rodents (rabbits, prairie dogs, rats), snakes, and lizards, which are usually found near brush or water. Look for land snails on rocks and bushes.

(2) Some birds are found on the desert. Try kissing the back of the hand with a sucking sound to attract them. Sand grouse, bustard, pelicans, and

even gulls have been seen over some desert lakes. Use a baited deadfall or a hook and gorge to catch them.

(3) Usually where there is water, there are plants. Many desert plants look dry and unappetizing, so look for some soft part that is edible. Try all soft parts above the ground—flowers, fruits, seeds, young shoots, and bark. During certain seasons, some grass seeds or bean bushes may be found. These beans grow on acacia trees that are often thorny and similar to mesquite or catclaw of the southwestern United States (fig. 7–1). The prickly pear (a type of cactus) is a native of the North and South Americas and is widely found in North Africa, the Near East, and Australian deserts (para 3–4).

(4) All grasses are edible, but the ones found in the Sahara or Gobi are neither palatable nor nutritious Try any plant found. The tasting of a plant is not fatal, even if the plant is poisonous. Dates may be available in the northern half of Africa, southwestern Asia, and some parts of India and China.

c. Native Food.

(1) Native food in the Sahara is both palatable and edible. In the Gobi desert, the native Mongols care little about cleanliness, therefore the food is unsanitary. Appeal to the natural hospitality of the natives for food—do not steal it.

(2) Native dairy products—milks, cream, ice cream, butter, and cheese—are very dangerous, as are fruits and other cooked foods given to you by the natives. If possible, trade for or buy raw food and prepare it yourself.

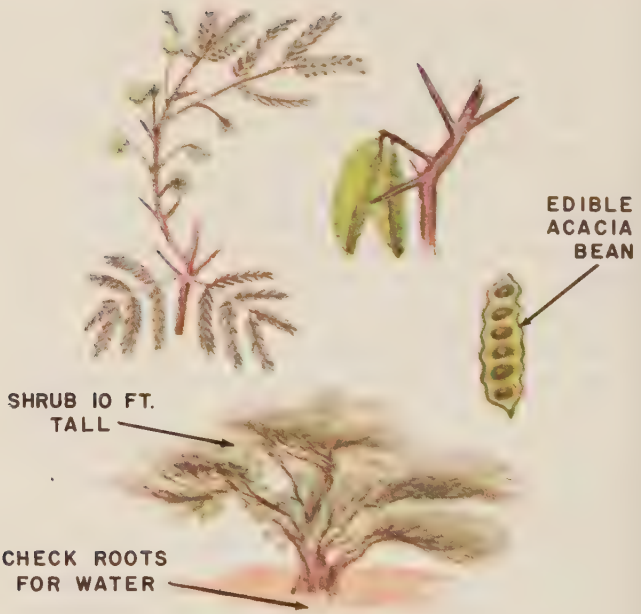

Figure 7–1. Acacia.

7–6. Firemaking
(chap 4)

a. Palm leaves and similar fuel are found in or near an oasis. On the open desert, however, use any bit of dead vegetation found. Dried camel dung can be used when there is no wood available.

b. Probably the most effective way of building a fire without matches is to direct sun rays through a magnifying glass. Other primitive methods of building a fire may not be available.

7–7. Clothing

a. Protect yourself against direct sunlight, excessive evaporation of perspiration, and the many annoying desert insects.

(1) Keep the body and head well covered during the day. Wear long pants and a long-sleeved shirt.

(2) Wear a cloth neckpiece to protect the back of the neck from the sun (fig. 7–2).

(3) If some clothing must be left behind to lighten your load, keep enough for protection against the cold desert nights.

(4) Wear clothing loosely.

(5) Open clothing only when well shaded. Reflected sunlight can cause sunburn.

b. Protection of the feet may be the difference between life and death. The following hints are helpful:

(1) Keep sand and insects out of the shoes and socks, even if frequent stops are necessary to clean them out.

(2) If you do not have boots, make some spiral puttees out of any available cloth. To do this, cut two strips, each 3 or 4 inches wide and about 4 feet long. Wrap them spiral-fashion upward around the top of the shoes. This will keep out most of the sand.

(3) Improvise a pair of sandals out of a sidewall of an old tire, if there are salvaged vehicles available (fig. 7–3). It is better, however, to reinforce the soles of the shoes with heavy cloth if it is only the worn condition of the soles that is causing trouble.

(4) Remove the shoes and socks while resting

Figure 7–2. Cloth neck protector.

in the shade. Use caution when doing this because the feet may swell, making it difficult to get the shoes back on.

(5) Do not try to walk barefooted. The sand

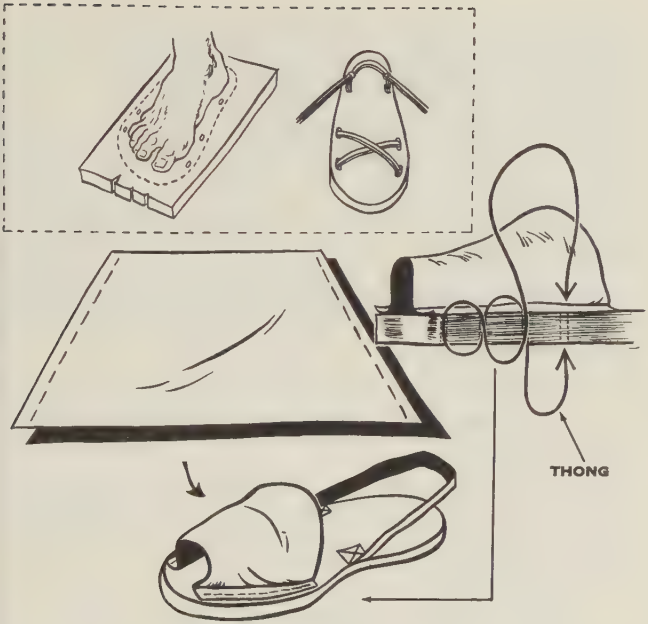

Figure 7–3. Improvised sandals.

will blister the feet. Also, a barefoot hike across a salt flat or mire will result in alkali burns.

(6) Improvise clogs to protect the feet around camp. Nail a strap to pieces of wood and attach them to the feet. Protect the tops of the feet from the sun.

7–8. Dehydration

a. General.

(1) In desert heat, thirst alone is not a strong enough sensation to indicate the amount of water needed. If only enough water is consumed to satisfy thirst, it will still be possible to dehydrate slowly.

Drink plenty of water whenever it is available, particularly at mealtime. If you drink only at mealtime, you tend to dehydrate between meals and are restored to normal after eating and drinking; however, you will often feel tired because of a loss of energy by dehydration.

(2) Efficiency lost by dehydration is restored quickly by drinking water.

(3) No permanent harm is caused by dehydration, even up to 10 percent of body weight. At 150 pounds, 15 pounds can be lost through perspiration, provided you drink enough water later to gain it back. Cold water will cause stomach distress if swallowed too rapidly.

(4) You can survive a 25 percent dehydration if air temperature is 85° F or cooler. At temperatures in the nineties and up, a 15 percent dehydration is dangerous.

b. Symptoms of Dehydration. At first there is thirst and general discomfort, followed by an inclination to slow down any movement, and a loss of appetite. As more water is lost, you become sleepy, your temperautre rises, and by the time you lose 5 percent of body weight, you will begin to feel nauseated. By the time 6 to 10 percent of body weight is lost, symptoms increase in this order: dizziness, headache, difficulty in breathing, tingling in the arms and legs, dry mouth, body turning bluish, speech indistinct, and inability to walk.

c. Preventing Dehydration. There is no substitute for water to prevent dehydration and keep the body operating at normal efficiency. Alcohol, salt water, gasoline, blood, or urine only increases dehydration.

In an emergency, it is possible to drink brackish water (water with about half as much salt as sea water) and obtain a net gain of moisture for the body. Any liquid containing a higher percentage of waste can only harm the body's cooling system. Chewing gum or pebbles held in the mouth may be a pleasant form of delaying the pangs of thirst; however, they are not a substitute for water and do not aid in keeping the body temperature normal.

CHAPTER 8

SURVIVAL AT SEA

8–1. General

a. Causes. There are many reasons why you may find yourself faced with the problem of surviving at sea. The ship or aircraft which you are aboard may be sunk or downed by natural hazards such as fire or collision, or by enemy action. The question is how to remain alive. This depends largely on the rations and equipment available, the use made of them, and your own skill and ingenuity.

b. Rations and Equipment. Lifeboats, rafts, and aircraft contain equipment adequate for emergencies at sea. Know this equipment, where it is stored, and how to use it. See that fishing tackle in included. Fish may be the only source of food and water. Become familiar with the lifeboat emergency equipment list, abandon ship procedure, and command procedure aboard the lifesaving craft.

8–2. Water

a. Rain, ice, and the body fluids of animal life are the only natural sources of water at sea. *Sea water is not drinkable.* It aggravates your thirst and increases water loss by drawing body fluids out of the

tissues to be eliminated by way of the kidneys and intestines.

(1) *Rain water.* Use buckets, cups, tin cans, sea anchor, boat cover, sails, strips of clean clothing, and all canvas gear in the boat to collect rain water. Devise catchments before there is an actual need. If the shower promises to be light, wet the receptacle in the sea. The salt contaminating the rain water will be slight, and the dampened cloth will prevent the fresh water from becoming absorbed in the fabric. The body can store water; therefore, drink all you you can hold.

(2) *Ice.* Sea ice loses its salt after a year and becomes a good source of water. This "old" ice is identified by rounded corners and its bluish color.

(3) *Sea water.* In freezing weather, fresh water can be obtained from sea water. Collect this water in a container and allow it to freeze. Since the fresh water freezes first, the salt concentrates as a slush in the core of the frozen fresh water. Remove this salt, and the remaining ice will be sufficiently salt free to keep you alive.

b. Chemical kits may be available in the raft or lifeboat. These kits can be used to remove the salt and alkaline substances from sea water. Directions accompany the kits.

8–3. Food

a. General. The sea is rich in different forms of life. The problem is to obtain this source of food. If fishing equipment is available, chances are excellent that you will have food; but even if there is no equipment, the situation is not hopeless.

b. Fish.

(1) *General.* Practically all freshly caught sea fish are palatable and wholesome, cooked or raw. In warm regions, gut and bleed fish immediately after catching them. Cut fish that are not eaten immediately into thin narrow strips, and hang them to dry. A well-dried fish stays edible for several days. Fish not cleaned and dried may spoil in half a day. Never eat fish that have pale, shiny gills, sunken eyes, flabby skin and flesh, or an unpleasant odor. Good fish should show the opposite characteristics. Sea fish should have a salt water or clean fishy odor. Eels are edible, but may be mistaken for sea snakes (para 2–19*e*). The heart, blood, intestinal wall, and liver of fish are edible. The intestines should be cooked. Also edible are the partly digested smaller fish which might be found in the stomachs of large fish. In addition, sea turtles are good food.

(2) *Fishing line.* Make a strong fishing line from pieces of tarpaulin or canvas by raveling the threads and tying together in very short lengths groups of three or more threads. Also use parachute suspension lines, shoelaces, or thread from clothing.

(3) *Fish hooks.* No one at sea should ever be without fishing equipment, but even without fishing tackle, you can improvise enough to survive.

(*a*) Hooks may be made from items with points or pins, such as nail files, collar insignia, and campaign ribbons; or, from bird bones, fish spines, and pieces of wood (para 3–7). To make a wood hook, shape the shaft and cut a notch near the end to hold the point. Sharpen the point so that the hardest part of the grain forms the tip of the hook.

Use strands of canvas to lash the barb and shaft together.

(*b*) Improvise fish lures by using a coin or snap hook, or a dime fastened to a double hook (fig. 8–1).

(4) *Bait grapple.* Gather seaweed by using an improvised grapple made of wood cut from the raft

Figure 8–1. Artificial lures from coins and attached hooks.

or boat. Use the heaviest piece of wood as the shaft, and cut three notches in which to fit three grapples. Lash them in place at a 45° angle. Tie a line to the shaft and drag the grapple behind the raft.

(5) *Bait.* Use small fish as bait for catching larger fish. Use the dip net from your fishing kit to scoop up these small fish. If no kit is available, make a net from a mosquito headnet, parachute cloth, or clothing fastened to oar sections. Hold the net under water and scoop upward. Save guts of birds and fish for bait. Use a piece of colored cloth, bright tin, or even a button from your shirt. Keep the bait moving in the water to make it appear alive. Try it at different depths.

(6) *Fishing at sea.* Use the following hints while fishing at sea:

(*a*) Do not handle spiny fish and those with teeth.

(*b*) Do not attach the line to anything solid; a big fish might break it. Do not wind the line around any part of your body.

(*c*) If a large fish is hooked, avoid capsizing the raft or boat.

(*d*) In a rubber raft, take care not to puncture it with hooks, knives, or spears.

(*e*) Fish for small fish. Avoid fishing when near sharks.

(*f*) Watch for schools of fish which can be seen breaking water. Move closely to a school if possible.

(*g*) Shine a flashlight on the water at night, or use a piece of canvas or cloth to reflect moon-

light. The light will attract fish which may leap into the raft.

(*h*) Shade attracts many varieties of small fish. A lowered sail or tarpaulin may gather fish.

(*i*) The flesh of all fish caught in the open sea (except jelly fish and the liver of some fish) is edible, cooked or raw. Raw fish are neither salty nor unpleasant. See chapter 2 for a list of poisonous fish and sea life.

(*j*) Make a spear or harpoon for catching large fish by tying a knife to an oar.

(*k*) If the fishing equipment is lost, try dangling a piece of fish or bird gut in the water. One survivor reported that he caught 80 fish in one day by allowing them to swallow a piece of gut and snatching them into his raft.

(*l*) Care for the equipment. Allow the lines to dry, and make certain that the hooks are not sticking into the line. Clean the hooks.

c. Seaweed. Raw seaweed is tough, salty, and difficult to digest. It absorbs body water, so eat it only if you have plenty of drinking water. Seaweed, however, is an important survival item because it usually harbors small edible crabs, shrimp, and fish. Use a grapple to gather seaweed. Shake seaweed over the raft to reveal the small edibles.

d. Birds.

(1) Eat any birds caught. They sometimes settle on the raft or boat, and survivors have reported instances where birds landed on their shoulders. If birds are shy, try dragging a baited hook or throwing a baited hook into the air.

(2) There are relatively few birds on the North Atlantic, and these are found mostly along the coasts. This is also true in the North Pacific. In southern waters, many species of birds are often seen hundreds of miles from land.

(3) Gulls, terns, gannets, and albatrosses can be caught by dragging a baited hook, or attracted within shooting distance by a bright piece of metal or shell dragged behind the raft. It is possible to catch a bird if it lands within reach. Most birds, however, are shy and will settle on the raft out of reach. In this case, try a bird noose. Make it by tying a loose knot with the two pieces of line as shown in figure 8–2. Bait the center of the hoop with fish entrails or similar bait. When the bird settles, tighten the noose around its feet. Use all parts of the bird; even the feathers, which can be stuffed inside your shirt or shoes for warmth.

8–4. Signs of Land

a. Indications of Clouds. Clouds and certain distinctive reflections in the sky are the most reliable indications of land. Small clouds hang over atolls and may hover over coral patches and hidden reefs. Fixed clouds or cloud crests often appear around the summits of hilly islands or coastal land. They are recognized easily because moving clouds pass by them. Other aerial indications of land are lightning and reflection. Lightning from a particular region in the early hours indicates a mountainous area, especially in the tropics. In polar regions, a sharply defined patch of brightness in a gray sky is a sign of areas of ice floe or shore ice in the midst of open water.

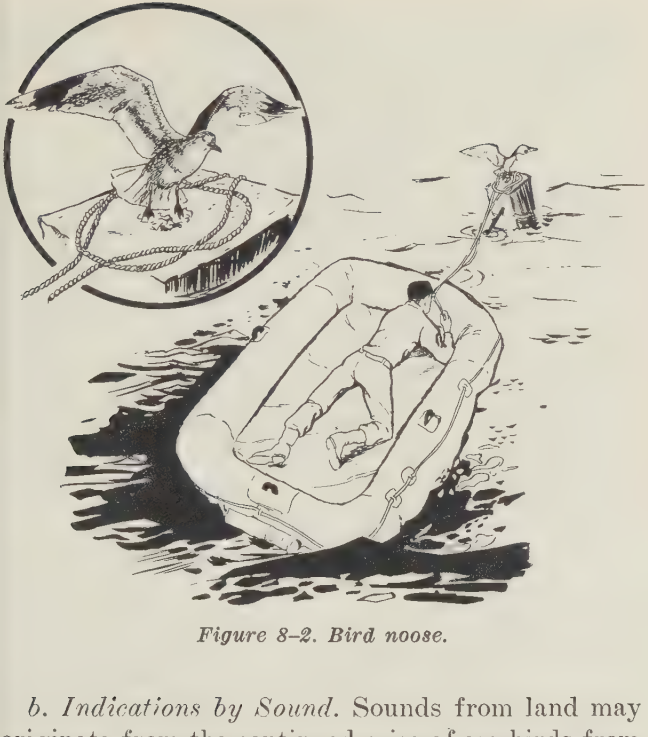

Figure 8–2. Bird noose.

b. Indications by Sound. Sounds from land may originate from the continued cries of sea birds from a particular direction, from ships or buoys, and from other noises of civilization.

c. Other Indications of Land. An increase in the number of birds and insects indicates nearby land. Seaweed, usually found in shallow water, may also indicate the nearness of land. Bay ice, which is usually smoother, flatter, and whiter than pack ice, indicates a nearby frozen inlet, especially if the pieces are close together. Land is also indicated by odors that may be carried by the wind for long

distances. This fact is important when navigating in heavy fog or at night. An increase in floating driftwood or vegetation means nearby land.

8–5. Care of a Rubber Raft

a. General. The chances of being a survivor of a downed aircraft are perhaps as likely as being a survivor of a sunken ship. Like ships, aircraft also carry rubber rafts. Know how to care for them.

b. Proper Inflation. Properly inflate the raft. If the main buoyancy chambers are not firm, use the pump or mouth inflation tube. Inflate cross seats if they are provided, unless there are injured men who must lie flat. Do not overinflate. Make air chambers well round but not drum tight. On hot days release some air because hot air expands.

c. Sea Anchor. Use the sea anchor (fig. 8–3), or improvise a drag from the raft case or bailing bucket to help maintain direction and location, especially if you intend to stay close to the wreckage of the ship or aircraft. Do not allow the anchor rope to chafe the sides of the raft. During a storm, a sea anchor will help the raft stay headed in the wind.

d. Spray and Windshield. Keep the raft as dry as possible. Rig a spray and windshield in stormy weather. To keep the raft balanced, put weight in center. If there are two or more persons aboard, let the heaviest sit in the middle.

e. Leaks. Leaks are more likely to occur at valves, seams, and on underwater surfaces. They can be repaired with plugs provided with the raft.

f. Sails. Never tie down both lower corners of a sail at the same time. A sudden gust of wind will tip

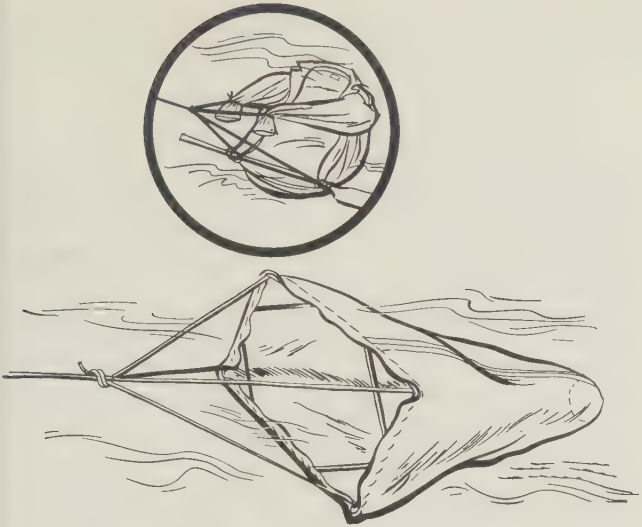

Figure 8–3. Sea anchor.

the raft. Provide some method of releasing one corner of the sail, or hold it if necessary.

8–6. Signaling

a. General. There are many ways to signal while surviving at sea—radios, flares, dye markers, mirrors, lights, and whistles. Do not use your signaling devices unless you are sure they will be seen or heard. In the absence of signaling equipment, churn the water with paddles or oars.

***CAUTION:* Make certain that you are trying to get the attention of friends, not the enemy.**

(1) *Radio.* If the lifeboat or raft is radio-equipped, follow the instructions for signaling and op-

erating that come with it. Be out of enemy range before using the radio.

(2) *Signaling mirrors.* See paragraph 2–15.

(3) *Lights and flares.* Instructions for the use of signal pistols, flares, smoke signals, and distress lights (normal lifeboat equipment) are found in watertight containers holding this equipment. The lantern and flashlight are valuable night lights and can be used for signaling.

(4) *Signal flags.* The best method of displaying the signal flag is for two men to stretch it taut by holding each end and moving it to present a flash of color. Signal flags flown from a mast can be seen from great distances.

(5) *Boat cover.* When using the tarpaulin or boat cover as a canopy, display it with the painted side up. Wave it when a rescue craft is in sight.

(6) *Whistle.* Use the whistle during periods of poor visibility to attract surface vessels or people ashore, or to locate other rafts when they become separated in the night.

b. Avoiding Detection. Take the following steps to avoid enemy detection:

(1) Travel during the night. Use the sea anchor during the day.

(2) Keep low in the raft.

(3) Stay covered with the blue side of the camouflage cloth up.

(4) Do not use the radio within 250 miles of enemy shores unless a friendly base is nearby.

(5) If detected and brought under fire by an enemy aircraft, be prepared to go overboard and

submerge. If in a 20-man raft, go overboard and come up under the raft.

8–7. Seamanship

a. Lookouts. All men in a raft should serve on watch except the injured or sick. Arrange so that one man is on lookout duty at all times. Rotate this duty at intervals no longer than 2 hours. The lookout should watch for signs of land, evidence of friendly and enemy personnel, and signs of chafing or leaking of the raft. He should be lashed to the raft.

b. Traveling. Wind and current will drift the raft. Use them if they are moving in the intended direction of travel. To use the wind, inflate the raft fully and sit high. Take in the sea anchor and rig a sail. Use an oar as a rudder. If the wind is against you, lower the sea anchor and huddle low in the raft to offer less wind resistance. Do not sail the raft unless you know land is near. Currents should not cause a problem, because in the open sea they seldom move more than 6 to 8 miles a day.

c. Raftsmanship. Take every precaution to prevent the raft from turning over.

(1) In rough sea, keep the anchor off the bow (front) and sit low. Do not stand up or make sudden movements.

(2) In extremely rough weather, have a spare sea anchor available in case the first one is lost.

(3) If the raft is capsized, toss the righting rope (on multi-place rafts) over the bottom. Move to the other side of the raft; place one foot on the floatation tube and pull. If there is no righting rope,

reach across and grab the lifeline on the far side. Slide back into the water, pulling the raft back and over. Most rafts have righting handles on the bottom. Twenty-man rafts need no righting since they are identical on both sides.

(4) To board a one-man raft, climb in from the narrow end, remaining as nearly horizontal as possible. This is also the proper way to board multiplace rafts when alone.

(5) If there are several rafts afloat, they should be tied together. Tie the stern of the first raft to the bow of the second, and rig a sea anchor to the stern of the second raft. Use a line approximately 25 feet long between rafts; adjust the length of the line so that when the raft is at the crest of a wave, the sea anchor will stay in a trough.

d. Physical Hazards.

(1) A physical ailment that can become serious aboard a raft is immersion foot. This is caused by continued exposure to cool or cold sea water and poor circulation.

(2) Continued exposure to salt water may cause salt water burns or boils. Do not prick or squeeze these boils; keep them dry.

(3) *Sunburn and frostbite.* See paragraphs 2–16, 7–3, and 7–7.

(4) *Seasickness.* Do not eat or drink if seasick. Lie down and change the position of the head frequently.

(5) Sore eyes are caused by glare from the sky and water. Prevent this by wearing sunglasses or improvising an eye shield from a piece of cloth or bandage. If no medicines are available, moisten a

piece of bandage, cotton, or cotton cloth with sea water and place this over the eyes before you bandage them.

(6) Constipation, lack of bowel movement, is normal on rafts. Do not take any available laxatives. Exercise as much as possible.

(7) Difficulty in urinating, or dark urine, are normal under such conditions.

PART TWO

EVASION

CHAPTER 9

CONCEPTS AND PRINCIPLES

Section I. GENERAL

9–1. Purpose

This chapter discusses evasion in general terms. The succeeding chapters discuss the two types of evasion, short- and long-range; the types and nature of assistance that might be expected; and evasion in special situations, to include stability operations.

9–2. Classification

a. Evasion is classified as either short-range or long-range. Short-range evasion takes place in or near the forward combat zone when return to friendly control can be accomplished within a matter of hours, or perhaps days. This situation would occur following isolation when the evader has adequate food and clothing, and when he is generally oriented as to direction, distance, and terrain. In contrast, a long-range evader, such as a downed pilot or an escaped prisoner of war (PW), must travel over completely

foreign terrain possibly for extended periods of time and with little or no food or equipment.

b. Evasion aids are items of equipment designed for the specific purpose of providing assistance to personnel evading the enemy.

9–3. Basic Principles

a. Successful evasion depends primarily upon the ability to—

(1) Prepare a detailed plan to include—

(*a*) Evading the enemy.

(*b*) Survival.

(*c*) Returning to friendly territory.

(2) Observe the elementary rules of movement, camouflage, and concealment.

(3) Take your time; hurrying while traveling increases weariness and decreases alertness. Patience, preparation, and determination are key words in evasion. Be confident, but careful.

(4) Conserve food.

(5) Conserve as much strength as possible for critical periods.

(6) Rest and sleep as much as possible.

b. Evasion may require living in the open for extended periods of time and traveling on foot over difficult terrain, often during inclement weather. A knowledge of survival techniques is essential.

Section II. EVASION TECHNIQUES

9–4. Initial Action

a. You become an evader when isolated in hostile areas, are unable to continue the assigned mission,

and are prevented from rejoining your unit. To avoid being killed or captured by enemy forces searching the battle area, leave the immediate area as soon as possible and select a hiding place at a safe distance. The situation must be evaluated and a plan of action prepared before leaving the initial hiding place.

b. The time you remain in this initial location is governed by enemy activity, your physical condition, and patience. This "hole-up time" should be used to regain strength and to evaluate the evasion problem ahead. When the time comes to travel, use the prepared evasion plan. Alternate plans and courses of action must be developed to cope with as many eventualities as possible.

9–5. Travel

Periods of travel probably are the most vulnerable phases of evasion. Many evaders have been captured because they followed the easiest and shortest route, or failed to employ simple techniques such as scouting, patrolling, camouflage, and concealment.

a. General. As a rule, the safest route avoids major roads and populated areas, even if it takes more time and energy.

b. Concealment and Camouflage. Full use must be made of concealment and camouflage. The use of the natural concealment afforded by darkness, wooded areas, trees, bushes, and terrain features are recommended; however, any method used for disguise or hiding from view will increase the chances for success. Camouflage and concealment are discussed in FM 5–20.

c. Disguise. As an evader, you should evaluate the desirability of disguise. Wearing civilian attire in the expectation of passing as a native of the area is hazardous and should be ruled out in any case where racial or ethnic characteristics are different from those of the people in the evasion area. Even in an area where racial differences would not betray you, the mannerisms of walking, eating, smoking, plus unfamiliarity with the language, could quickly arouse suspicion, leading to investigation and possible capture.

(1) Under established International Law, you are considered a belligerent until captured. As long as the national uniform is worn, soldiers are considered to be under orders to evade capture, and not to surrender voluntarily. This entitles you to commit acts of violence against legitimate military targets without the risk of prosecution after capture for violation of the local criminal law. For example, it would be permissible to kill, in the line of duty, any of the enemy who may impede your effort to evade capture. Such entitlement does not extend to you as an escapee. Such a killing by you as an *escapee* would be considered murder and you would be liable for trial and punishment.

(2) Article 29 of the IV Hague Convention states that a soldier can only be considered a spy when, *acting clandestinely*, he tries to obtain information about the enemy in the enemy's area of operations with the intention of communicating it to or returning with the information to his parent organization. Thus, *uniformed* soldiers performing reconnaissance missions are not considered spies.

(3) The right to be treated as a PW is lost when your military status is deliberately concealed in an enemy country in order to gather military information or to wage war. Therefore, if captured while disguised or wearing the uniform of the enemy, your responsibility would be to show that your status was not concealed for the purpose of gathering military information or for waging war.

(4) Disguise should not be rejected entirely since the occasion may arise when persons giving assistance direct a change of clothing. If the disguise is assumed, however, retain some type of military identification such as identification tags or an identification card (DD Form 2A). Assisted evasion is discussed in chapter 12.

d. Day Versus Night.

(1) When feasible, travel under cover of darkness. If, however, you suspect that your location is known to the enemy or local civilians, move immediately.

(2) Whenever possible, the terrain to be traversed during the night should be observed during daylight hours. Be particularly attentive to the concealment it will provide and the obstacles over or around which you are to travel.

e. Maps. Any maps of the area in your possession should not be marked. A marked map in enemy hands can lead to the compromise of persons and locations where assistance was given. Do not mark the map accidentally; for example, soiled fingers will mark as plainly as a pencil.

f. Shelter. Existing shelters such as abandoned houses, barns, caves, haystacks, and similar struc-

tures should be avoided. Such structures are almost certain to come to the enemy's attention when searching for an evader. Although shelters of this type are condemned in principle, the terrain or climate may leave little choice.

g. Progress. Progress on the ground is measured in stopover points reached. Speed and distance are of secondary importance. Do not let failure to meet a precise schedule inhibit the use of a plan.

9–6. Obstacles

Throughout the evasion effort, many obstacles may be encountered which may impede you or influence selection of travel routes. These obstacles can be divided into *natural obstacles*, such as rivers, streams, or mountains, and *human obstacles*, such as border guards or enemy troops. Some of these obstacles may be converted into assets while others might be a hindrance.

a. Natural Obstacles.

(1) *Rivers and streams.* When crossing rivers and streams, bridges and ferries can seldom be used since the enemy normally establishes checkpoints at these locations. This leaves a choice of fording, swimming, crossing by boat, or use of some improvised field expedient. Water crossings are discussed in chapter 2.

(2) *Mountains.*

(*a*) In mountainous areas, *survival* may be the primary concern. It may be necessary to remain in one location for an extended period of time, perhaps even waiting for the coming of spring before attempting to travel. Many mountainous areas, how-

ever, are havens which afford cover, water, food, and low population densities. Also, the chances of receiving assistance from individuals in areas where homes and farms are separated by great distances are more likely.

(*b*) For detailed information concerning techniques for traveling and surviving in mountains, see chapter 2.

b. Artificial Obstacles.

(1) *Electrified fences.*

(*a*) For indications of electrified fences, watch for—

1. Dead animals.

2. Insulators on the wire.

3. Flashes from the wire which occur during heavy storms and from short circuits.

(*b*) To determine if a wire is electrified, use this quick and simple test. Carefully approach the wire, making no quick movements which might cause you to touch the wire accidentally. Hold a stem of grass or a damp stick on the wire. If the wire is charged, you will receive a mild shock, but will not be injured.

(2) *Contaminated areas.* The problem of crossing areas which have been contaminated as a result of enemy or friendly CBR operations may arise. Chemical contamination should be suspected when the following are observed:

(*a*) Shell craters with liquid in the bottom.

(*b*) Liquid droplets on vegetation.

(*c*) Water with "film" on the surface.

(*d*) Unexplained dead animals.

(*e*) Unseasonal discoloration of vegetation.

Note: Without protective clothing, mask, and accessories, by-pass these areas if possible.

c. Border Crossing.

(1) The crossing of one or more borders presents a major problem. Border areas may be located in any type terrain.

(2) In areas where there is no well-defined terrain feature to indicate the border, man-made obstacles such as electrified or barbed wire fences, augmented with trip wires, antipersonnel mines, or flares, may be encountered. Open areas may be patrolled by men or dogs, or both, particularly during the hours of darkness.

(3) In open terrain, the enemy may employ floodlights and plowed strips as aids to detecting evaders.

(4) The plan to cross a border must be deliberate and must be designed to take advantage of unusually bad weather, as major distraction to the enemy force, or areas where security forces are overextended. These areas usually are found where there are natural obstacles.

(5) Crossings should be made at night when possible. If it is necessary to cross during daylight hours, select a crossing point that offers the best protection and cover. Then keep the area under close observation for several days to determine—

(*a*) The number of guards.
(*b*) The manner of their posting.
(*c*) Aerial patrols and their frequency.
(*d*) The limits of the areas they patrol.
(*e*) Location of mines, flares, or trip wires.

d. Frontline Crossings.

(1) *General.* A difficult task in any situation is the attempt to cross the forward edge of the battle area. If unable to determine the general direction to friendly lines, remain in position and observe the movement of enemy military forces or supplies, the noise and flashes of the battle area, or the orientation of enemy artillery. After arriving in the combat zone, select a concealed position from which as much of the battle area as possible may be observed. Select a route and critical terrain features on which you can guide when exfiltrating back to friendly positions under the cover of darkness. Several alternate routes should be selected with care to avoid "easy" approaches to friendly lines which are more likely to be covered by friendly fires and enemy patrols. If in uniform, select exposure time during daylight hours and be close enough to be easily recognized by friendly troops.

(2) *Friendly patrols.* Watch for friendly patrols. Once a patrol is spotted, remain in position and allow the patrol to approach. When the patrol is close enough to recognize you, display a white cloth and call out a greeting that is clearly and unmistakably of American origin. It is imperative that, at the time of contact, there is sufficient light for the patrol to identify you. In the event you elect not to establish contact, you should, if possible, observe their route and approach friendly lines at approximately the same location. This will enable you to avoid mine fields and booby traps.

(3) *Friendly outposts.* If unable to contact a friendly patrol, the only alternative may be to make

a direct approach of front line positions. This will require crawling through the enemy's forward positions to a position near forward friendly elements. This action should be accomplished during the hours of darkness. Once near friendly lines, however, do not attempt to make contact until there is sufficient light for you to be recognized. As in establishing contact with a friendly patrol, call out something typically American and wave a white cloth.

e. Rescue by Aircraft. If rescue by helicopters or fixed wing aircraft is likely, use the standard SOS distress code and methods of improvising signals (fig. 2–10). Ground-to-air signal displays should be arranged so that they can be removed at a moment's notice since enemy aircraft may also fly over your immediate area.

Section III. EVASION AIDS

9–7. Blood Chit

a. The blood chit is a small rayon American flag bearing an inscription in several languages that identifies the bearer as a member of the U.S. military forces and promises a reward for your return to U.S. control (fig. 9–1).

b. Each blood chit is assigned a distinctive number which is to be given to the person or persons who provide assistance. Give only the number and maintain physical possession of the chit, if at all possible. The blood chit is registered by the headquarters of the organization to which you are assigned. The loss of blood chits, in administrative and tactical situations, should be reported at the first opportunity.

ENGLISH

I AM AN AMERICAN. I DO NOT SPEAK YOUR LANGUAGE. MISFORTUNE FORCES ME TO SEEK YOUR ASSISTANCE IN OBTAINING FOOD, SHELTER AND PROTECTION. PLEASE TAKE ME TO SOMEONE WHO WILL PROVIDE FOR MY SAFETY AND SEE THAT I AM RETURNED TO MY PEOPLE. I WILL DO MY BEST TO SEE THAT NO HARM COMES TO YOU. MY GOVERNMENT WILL REWARD YOU.

*

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12345 A

BLOOD CHIT CONTROL NUMBER

* VARIOUS TRANSLATIONS OF THE ENGLISH TEXT IN LANGUAGES INDIGENOUS TO THE OPERATIONAL AREA.

Figure 9–1. Blood chit.

9–8. Payment of Blood Chit Reward

See FM 21–77A.

9–9. "Pointee Talkee"

a. The "pointee talkee" is a language aid which contains selected phrases in English on one side of the page and the foreign language translations on the other side. Determine the question or statement to be used in the English text and then point to its foreign language counterpart. In reply, the native will point to the applicable phrase in his own language; you then read the English translation (fig. 9–2).

b. "Pointee talkee" phrases are presented under the following eight subheadings:

(1) Finding an interpreter.
(2) Courtesy phrases.
(3) Food and drink.
(4) Comfort and lodging.
(5) Communications.
(6) Injury.
(7) Hostile territory.
(8) Other military personnel.

9–10. Maps

a. A map designed specifically for evasion purposes may be issued to potential evaders. These maps normally are water resistant and are printed on a scale of 1/2,000,000 or smaller. It is recognized that these maps are not detailed enough to provide accurate navigation; however, they should assist you in general orientation and direction.

b. Misjudgment is the chief difficulty facing the user of the small-scale map. It is difficult, at times, to identify a city, mountain, river, or other terrain feature. To overcome this difficulty, seek as many cross-references as possible when orienting yourself.

INTRODUCTORY MATERIAL

FIRST SHOW NATIVE TEXT ON THE OPPOSITE PAGE TO THE PERSON WITH WHOM YOU ARE TRYING TO COMMUNICATE. THIS WILL EXPLAIN TO HIM THE PURPOSE AND USE OF THE HANDBOOK.

THEN FIND THE QUESTION WHICH YOU WISH TO ASK, AND POINT TO ITS LANGUAGE COUNTERPART. IN REPLY THE NATIVE WILL POINT TO THE PHRASE HE WISHES TO USE AS AN ANSWER. ALL QUESTIONS ARE ON THE LEFT-HAND PAGES; ANSWERS ON THE RIGHT-HAND PAGES.

UNUA ELMONTRI INDIĜUEA TEKSTO SUR KONTRAŬA PAĜEO AL LA PERSONO KUN KIUM VI PENANTA KOMUNIKIĜI. ĈI KLARIGAS AL LI CELO KAJ UZO DE MANLIBRO.

TIAM TROVAS LA DEMANDO KIO VI DESIRAS SCII, KAJ FINGROMONTRI ĜIJ LINGVO KONTRAŬ PARTO. JE RESPONDO LA INDIGEUA FINGROMONTRI AL LA FRAZO LI DEZIRAS UZI KIEL RESPONDO. TUTA DEMANDOJ ESTAS SUR LA MALDEKSTRAMANO PAĜEOJ: RESPONDOJ ESTAS SUR LA DEKSTRAMA PAĜEOJ.

I. FINDING AN INTERPRETER

1. DOES ANYONE SPEAK ENGLISH? (OTHER)?	1. CŬ IU ĈI TIE PAROLAS ANGLE? (ALIA)?	1. JES NE MI FARI NE SCII.	1. YES NO. I DON'T KNOW.

(IF YOU SPEAK A FOREIGN LANGUAGE CONSULT YOUR INTELLIGENCE OFFICER FOR THE TRANSLATION)

---

2. PLEASE GET A DOCTOR.	2. BONVOLU OBTEUI KURACISTON.	2. MI PROVAS.	2. I'LL TRY.

Figure 9-2—Continued.

II. COURTESY PHRASES

1. GLAD TO MEET YOU.	1. ESTAS PLEZURO KONI VIN.
2. IT IS TIME FOR ME TO LEAVE NOW. THANK YOU!	2. ESTES TEMPO POR MI NUN FORIRI. DANKON !
3. GOODBYE.	3. ADIAŬ.

III. MISCELLANEOUS

1. WHEN DOES THE PLANE LEAVE?	1. KIAM FORIROS LA AEROPLANO?	1. AT SEVEN O'CLOCK.	1. SEP HORO.
2. I HAVE HURT MY FOOT.	2. MI DOLORIS MIAN PIEDON.	2. ARE YOU ALL RIGHT?	2. ĈU VI FARTAS BONE?

Figure 9–2—Continued.

CHAPTER 10

SHORT-RANGE EVASION

10–1. Special Aspects of Short-Range Evasion

a. Short-range evasion generally is conducted relatively near friendly areas as a result of isolation of units or individuals who are separated or lost from their parent unit.

b. The principles and aids discussed in the preceding chapter are applicable to short-range evasion.

10–2. Hazards of Isolated Units

In the past, most prisoners of war were captured when their units were isolated by enemy action. Under modern concepts of land warfare, the threat of isolation faces all round combat units.

10–3. Courses of Action

When a unit becomes isolated, some courses of action to be considered are—

a. Continue mission as originally assigned.

b. Defense of present position.

c. Breakout to areas under friendly control.

d. Evasion by exfiltration.

e. Combination of any of the above.

10–4. Defense of Present Position

The defense of your present position may be adopted when your unit occupies or can move to good defensive terrain, and early relief by friendly forces is probable. The decision to hold or to attempt evasion rests with the next higher headquarters. If there are no communications with this headquarters, the decision is made by the senior man present.

10–5. Breakout to Areas Under Friendly Control

a. A breakout is appropriate when the enemy forces opposing an isolated unit are relatively weak. If this is the action decided upon, the breakout should be accomplished as soon as practicable. The longer aggressive action is delayed, the greater the advantage gained by the enemy.

b. A hastily conceived but aggressively executed plan may in some cases, be more desirable than a deliberate plan that is not timely. The actual breakout may be improved by taking advantage of the cover of darkness or inclement weather conditions; however, this will depend upon the situation.

c. For the specific tactics and techniques of a breakout, see FM 31–16, FM 31–20, and FM 31–22.

10–6. Evasion by Exfiltration

The alternative to the breakout is evading by exfiltration. This may be the best solution if a breakout is impracticable. Separate into groups of not more than four men, with one man in command of each group. This size group reduces the chance of detection, improves movement and control, and increases confidence through the use of the buddy system.

10–7. Other Alternatives

a. Any other course of action taken to avoid capture is justified as long as it does not violate existing rules of warfare. You are subject to trial as a war criminal if such rules are violated: for example, if a hostage is killed who is no longer needed for the purpose of escape or evasion, or if the Red Cross emblem is misused to gain protection to which you are not entitled.

b. A combination of any of the above alternatives might be the solution for a given situation.

10–8. Evasion Techniques

a. When evading alone, avoid panic, overcome fear and shock, and think before acting. Recall any previous briefings, SOP, or training, and choose a course of action that will help in returning to friendly territory. Assess those factors to your advantage (terrain, water, weapon, etc.), and those to your disadvantage (terrain, enemy, distance, etc.) before selecting a course of action.

b. If forced to parachute into hostile areas, decide what equipment to keep and how and where to dispose of the remainder. Presume that the enemy observed your descent. The important thing is to get away from the scene of landing as soon as possible, even at the expense of leaving material behind.

c. Contact no one, except in the special case of trying to get in touch with assistance personnel in an E &E net (ch 12).

d. The principles and techniques discussed in chapter 9 should be followed from this point.

10–9. Evasion in Stability Operations

The general nature of stability operations requires a variation of evasion techniques since there is little distinction between friendly and hostile territory. Areas that are under friendly control one day may be under the control of insurgent forces the next day.

a. Advantages.

(1) In this type environment, friendly forces may provide a measure of security throughout the country. Therefore, distances to be traveled may be much shorter than in other types of warfare.

(2) The risk involved in contacting the local population must be considered carefully. When evading with friendly indigenous personnel, contact with the natives of the country is easier. Knowledge of the environment, language, customs, ethnic groups, and peculiarities of the various locales make traveling and contact easier and more secure.

(3) You may be oriented in relation to present position, location of friendly units, and the current tactical situation.

b. Disadvantages.

(1) It is difficult to distinguish the insurgent from the friendly populace. Also, since the government forces may employ a nonuniformed paramilitary force against the insurgent force, it is possible to mistake friendly personnel for insurgents and vice versa.

(2) Little or no assistance from local "neutrals" may be expected since much of the population lives in fear of the insurgent force.

(3) Occasionally, it is worthwhile for the insurgent force to take selected prisoners for propaganda purposes; but normally an insurgent unit cannot afford to allow prisoners to interfere with its movement. Even when they do take prisoners, the insurgent force often has never heard of, nor will it follow, the provisions of the Geneva Convention regarding the treatment of prisoners.

(4) Since most insurgencies occur in less developed areas of the world, the majority of which are located in tropical or semi-tropical regions, survival presents problems peculiar to these conditions.

CHAPTER 11

LONG-RANGE EVASION

11–1. Special Aspects of Long-Range Evasion

a. Long-range evasion differs from short-range evasion in several aspects.

(1) Distance from friendly forces is greater, ranging from hundreds to even thousands of miles.

(2) The will to survive and the knowledge of survival techniques become more important.

(3) Conditions such as travel restrictions, security checks, and border crossing are more likely.

(4) Supply economy will have to be planned and practiced. Items such as shoes, clothing, and supplies must be cared for to assure maximum usage.

b. In long-range evasion, make a careful, deliberate analysis of every possible course of action before abandoning the relative security of one position for another. It is possible that the enemy may be aware of your existence and has probably initiated actions to capture you.

11–2. Long-Range Evaders

a. Long-range evaders may be personnel from downed aircraft, personnel separated from air-landed or airmobile operations, and escaped prisoners of war.

b. Long-range patrols, airborne units, armored reconnaissance units, and special operations elements which frequently penetrate deep into hostile territory are also potential long-range evaders.

11–3. The Will to Survive and Evade

a. Knowledge that you may have to travel hundreds of miles over a period of many months may be discouraging. Therefore, a strong will to survive, together with an ability to withstand hardships and overcome obstacles, are mandatory.

b. The determination to survive must be maintained at times by sheer will power, and it should be recognized that many of the obstacles to be overcome are *mental* rather than physical.

11–4. Maintaining the Will to Survive

Some factors and conditions that may help to maintain the will to survive are—

a. Sense of Responsibility. Loyalty to country and military duty.

b. Family and Home Ties. Desire to return to home and family.

c. Control of Panic. Maintain self-control and think the problem through.

d. Planning. Prepare a plan that makes use of all available resources.

e. Patience. Be patient and willing to wait.

f. Endurance. Pain, discomfort, and other unpleasant conditions must be accepted as normal and must be endured.

g. Strong Help the Weak. In a group, encourage

those who want to give up. Help to bring them through by calming their fears and persuading them to do their best.

h. Knowledge of Survival and Evasion and Escape (E & E) Techniques. It it seldom possible to evade and survive for long periods unless you are psychologically prepared to overcome all obstacles. Through training, be convinced that you can and will survive, whatever the odds. The evasion area is an extension of the battlefield; therefore, do not give up as long as you have the means to continue.

i. Self Preservation. A group leader who possesses great faith and a desire for self preservation enhances the chances of survival.

11–5. Considerations in Long-Range Evasion

The three major considerations in long-range evasion are—where to go, attitude of population, and considerations for survival. Some additional factors which might be unimportant in short-range evasion, but may become major problems in long-range evasion are—

a. Travel restrictions such as curfews, checkpoints, and roadblocks have to be anticipated and cover stories devised.

b. Customs of local people require study for possible imitation to avoid being conspicuous.

c. Information on specific border areas should be obtained and studied.

d. Before contacting local natives, carefully consider both the advantages and disadvantages.

11–6. Planning for Long-Range Evasion

Planning for long-range evasion must be continuous,

as detailed as knowledge of the enemy situation will permit, and flexible enough to meet unforeseen circumstances.

a. If captured, plan for the early phases of evasion concurrently with escape planning. The scope and extent of the evasion plan prepared while in custody vary according to the amount and type of information available concerning the population and the evasion area. Information available to escape committees (para 17–3) may range from limited to complete information as to enemy security measures, checkpoints, travel restrictions, customs of the people, and information concerning areas where U.S.-sponsored guerrillas may be operating (para 12–9). In some instances, maps of the area may be available. Again, reasonably accurate maps may be made from information received from other prisoners and from sympathetic or careless guards.

b. Lack of information concerning security measures employed by the enemy immediately outside of the confinement area may result in rapid recapture. Therefore, plan the initial phases of long-range evasion while still in prisoner status. A well organized escape committee usually can distract guard personnel long enough to insure at least a few hours start before the escape is detected.

11–7. Available Courses of Action

Courses of action available to the long-range evader are—

a. Evasion by exfiltration.
b. Evasion by deception.
c. Combination of the above.

11–8. Evasion by Exfiltration

Usually, exfiltration is the most successful course of action for individuals or small groups evading in hostile areas. When contact with local natives is not feasible, you will be required to live off the land and complete the entire trip without assistance. In some areas such as the Arctic or desert, it may become necessary to seek assistance from natives in order to survive. Methods of contacting natives are discussed in the following chapter; however, this action should be taken as a last resort. Should it be known that a particular area is an unconventional warfare operational area (UWOA), contact should be attempted with a U.S.-sponsored guerrilla force. A UWOA is a geographical area designated for the organization and conduct of guerrilla warfare and related unconventional warfare activities.

11–9. Evasion by Deception

In many parts of the world, it is impossible to travel without coming into contact with civilians. Evasion by deception under these circumstances is necessary. Deception may require the use of disguise and cover stories explaining your presence in the area. Deception is perhaps the most difficult type evasion to take. See chapter 9 for a discussion of this technique.

11–10. Combination of Courses

Circumstances may dictate combining several courses of action. The first phase of evasion may be accomplished without assistance of any kind, employing exfiltration tactics and living off the land. Later phases may require the use of deception when

passing through populated areas. Weigh all factors before reaching a decision as to a specific course of action.

11–11. Collecting Enemy Information

Because of your military background and training, intelligence officers will rate you as a very reliable source of information. Do not, however, jeopardize personal safety or compromise cover for the specific purpose of collecting information. Do, however, observe and memorize in as much detail as possible: enemy strength, equipment, location, disposition, organization and movement—the common Order of Battle intelligence. Do not record anything. Such information found on the person may convict you of espionage.

CHAPTER 12

ASSISTED EVASION

12–1. General

a. It can be expected that there normally will be people in a hostile nation, or in an enemy-occupied country, who are dissatisfied with existing conditions. These circumstances favor active resistance movements. One of the functions of such movements may be the operation of E&E systems for the purpose of returning Allied evaders to friendly territory.

b. U.S. Army Special Forces (SF) may also organize and operate E&E mechanisms in assigned unconventional warfare operational areas (UWOA) (FM 31–21).

c. This chapter discusses assistance rendered by both types of E&E organizations.

12–2. Type Assistance

Assistance may range from that rendered by a sympathetic individual to elaborate E&E nets organized by local inhabitants. E&E nets may be limited in nature, such as providing assistance to reach a national frontier, or they may be linked to larger organizations capable of returning you to friendly control.

12–3. E&E Lines

An E&E line is a system of one or more secret nets organized to contact, secure, and, when possible, evacuate friendly personnel. Well organized and supported lines normally can be expected to provide the following assistance:

a. Temporary shelter, food, and equipment for the next phase of the journey.

b. Clothing and credentials acceptable in the area to be traveled.

c. Information concerning enemy security measures along the evasion route.

d. Local currency and transportation.

e. Medical treatment.

f. Available native guides.

12–4. Conduct of E&E Lines

The success of an E&E organization depends almost entirely upon its security. The organization of a line includes much planning and work carried out under dangerous conditions. The security of the system often depends upon the evader's cooperation and working knowledge of how it functions, how it may be contacted, and what rules of personal conduct are expected of him. The following paragraphs summarize the major aspects of the operaion of an E&E line.

12–5. Contacting the Line

During combat operations, the theater commander may provide combat forces with information as to general areas under enemy control where evasion and escape mechanisms have been established. He

may provide, in addition, certain signals which will aid in the recognition of evaders by members of an evasion and escape mechanism. After being picked up by an evasion and escape mechanism, you will be moved under the control of this mechanism to territory under friendly control, or to a removal area, and arrangements will be made for air or sea rescue. The organizer of a line in friendly but enemy-occupied territory normally will have arranged a network of spotters to contact and assist you. These spotters will be especially active when you are in the immediate area, but so will the enemy police and counter-intelligence organizations. For this reason, certain precautions must be observed when making contact.

a. Approach. When approaching anyone, it is important not to do so in the presence of witnesses, and, equally important, not to approach a house when there are people nearby. In enemy-occupied countries, people seldom trust one another unless they are close friends or work together in the resistance effort. Help may be refused by a person simply because he thinks someone else has seen you approach to seek assistance. If captured with a local helper, you will become a prisoner, but the helper and perhaps his entire family may be more severely punished.

b. Making Contact. Contacts with the natives are discouraged unless observation shows that they are dissatisfied with the local governing authority, or previous intelligence has indicated that the populace is friendly. Proceed to, and remain in, the nearest safe area where arrangements for contact can be

developed. If the E&E system is operating successfully, the spotter will know that you are present and will search the immediate area, making frequent visits to designated contact points. Identification signs and countersigns, if used, will be included in the preoperational briefing. It is seldom advisable to seek first contact in a village or town. Strangers are conspicuous by day, and there may be curfews or other security measures during the hours of darkness. The time of contact should be at the end of the daylight period or shortly thereafter. Darkness will add to the chance of escape, should the contact prove to be unfriendly, and may be advantageous to the contact in providing further assistance.

c. Procedure After Contact. If contact is made, you may be told to remain in the vicinity where spotted, or, more likely, you will be taken to a house or other structure used by the E&E net as a holding area. It must be decided at this time whether or not to trust the contact. If there is any doubt, attempt to leave at once. It is also possible that the house may not belong to the E&E organization, but rather to someone who will look after you until arrangements can be made for the line to identify and accept you in the E&E net. In any case, you will have two choices—one is to leave and continue to evade by yourself, and the other is to stay with the net. Having made this decision, stick to it and follow instructions. The contact or spotter, of necessity, may be playing a role demanding that he do things which appear to cast doubt on his loyalty to the escape organization, such as being on good terms with the local authorities.

12–6. Establishing Identity

Verification of identity will be required before being accepted as a bona fide evader. The constant danger facing the operators of an escape line is the penetration of the E&E system by enemy agents pretending to be evaders or escapees. Be prepared to furnish proof of identity or nationality. Since it may lead to later difficulties of identification, never give a false name—just your name, grade, service number, and date of birth. It is best to avoid talk as much as possible.

12–7. Awaiting Movement on the Line

a. Delays can be expected while proceeding along the escape line. If the period of waiting is prolonged, frustration and impatience may become unbearable, leading to a desire to leave the holding area. This must *not* be done, because if seen by other people, the lives of the assisting personnel and the existence of the entire line itself may be endangered.

b. Follow the orders of those assisting you. If kept indoors for any length of time, keep fit by moderate physical exercise. Try to walk a mile or two every day, even if this means pacing back and forth in a room or passage.

c. The host should have a plan for rapid evacuation of the area, if enemy personnel should raid the holding area. If not, have a personal plan, including measures for removing all traces of having occupied the area.

12–8. Traveling the Line

It would be a grave breach of faith and security to discuss at any point on the line the earlier stages

of the journey. For security reasons and to protect the compartmentation of the line, no information should be revealed. It is also useless to ask where a line leads or how it will eventually reach friendly territory. Do not try to learn or memorize names and addresses, and above all, do not put these facts or any other information in writing. Give the impression of having received no assistance from local inhabitants.

a. Fellow Evaders. Caution is required in the case of fellow evaders on an escape line, unless they are personally known. Even when it has been satisfactorily determined that another man is a genuine evader, no information should be given.

b. Travel With Guides. If under escort, this fact should not be apparent to outsiders. In a public vehicle, for example, never talk to the guide, or appear to be associated with him. This will lessen the possibility of you both being apprehended if one should arouse suspicion. It should always be possible for the guide to disown you, if he gets into difficulty. When escorted, follow the guide at a safe distance, rather than walk beside him, unless instructed to do otherwise.

c. Speaking to Strangers. Never speak to a stranger if it can be avoided. As a last resort, pretend to be deaf and dumb or even half-witted. This device has often been successful. To discourage conversation in a public conveyance, pretend to read or sleep.

d. Personal Articles and Habits. Do not produce articles in public which might show their national origin. This pertains to items such as pipes, cigarettes, tobacco, matches, fountain pens, pencils, and

wrist watches. Watch personal habits; for example, do not hum or whistle popular tunes or utter involuntary oaths. Again, in restaurants, watch and imitate local customs in the use of knives and forks and other table manners.

e. Payment to Helpers. On an escape line, do not offer to pay for board, lodging, or other services rendered. These matters will be settled afterwards by those who are directing and financing the line. If in possession of an escape kit or survival pack, keep it as a reserve for emergency. If you have no food reserve, try to build up a small stock in case you are forced to abandon the line.

12–9. Assisted Evasion in the UWOA (s)

U.S. Army Special Forces (SF) operational detachments which infiltrate hostile or enemy controlled areas in time of war for the purpose of conducting UW operations are trained to organize and operate E&E mechanisms. This training involves specialized and classified methods and techniques.

12–10. E&E Activities in the UWOA

See FM 21–77A, 31–21A, and 31–20A.

PART THREE
ESCAPE
CHAPTER 13
CAPTURE

Section I. GENERAL

13–1. Code of Conduct

The Code of Conduct is applicable to each member of the Armed Forces. Military training in support of this Code has the primary objective of increasing unit fighting strength, and, simultaneously strengthening the will to resist. This training will assure that—

a. Even as a PW, you continue to be of special concern to the United States; you will not be forgotten.

b. Every available national means will be employed to establish contact with you, to support you, and to gain your release.

c. The laws of the United States provide for the support and care of dependents during periods in which you serve in PW status or are detained in a foreign country against your will.

13–2. Prevention of Capture

a. Capture usually is neither dishonorable nor

heroic. At times it is unavoidable, and often it is the result of injury. Experience shows, however, that a majority of those persons taken into custody could have avoided capture by applying basic evasion tactics. Case histories reveal that many soldiers made no attempt to avoid capture, or in many instances, withdrew from tactical positions and later were captured.

b. If captured, you must then make every effort to develop and execute a plan of escape. This principle is clearly stated in Article III of the Code of Conduct.

13–3. Communist Handling of PW

During World War II, the communists in Europe moved prisoners to the rear in open terrain where possible. Halts in villages where escapees would have cover were avoided. For small numbers of prisoners, the regimental assembly point was near the regimental command post. For large numbers of prisoners, it was the regimental rear echelon headquarters. Communist regulations prohibited locating prisoner collection points in dense woods or underbrush. In evacuating large numbers of prisoners, two guards led the column with the escort commander, while a majority of the guards brought up the rear. Prisoners were not permitted to delay the march or to talk to guards, civilians, or other prisoners. These procedures for handling prisoners are typical and are likely to be followed by any future conventional enemy. See paragraph 10–9*b*(3).

Section II. ESCAPE PRIOR TO CONFINEMENT IN PW CAMP

13–4. Advantages of Early Escape Attempts

It is your duty to attempt to escape as soon after capture as possible. Chances of a successful escape are greater at that time as the following factors work to your advantage:

a. At the time of capture, you will be closer to friendly lines than at any other time while in custody; you will be oriented as to direction; and will know where friendly forces are located. If not injured, you are in better physical condition at this point than you will be while in custody.

b. Because enemy personnel in the forward combat zone generally are not as well trained as regular prisoner guards, many opportunities for escape will exist. The danger of being shot by a guard immediately after capture, however, is greater in the forward combat zone because combat troops are keyed to battle pitch and may shoot at the slightest provocation.

13–5. Opportunities for Early Escape

Opportunities for escape during transit occur frequently whether travel is by foot, vehicle, or rail. Once the opportunity to escape occurs, success will depend on a quick estimate and prompt action to take advantage of any unexpected occurrence. Stay alert to take advantage of the following situations:

a. Friendly mortar and artillery barrages or air attacks which create mass confusion. Guards often will take cover, providing a chance for escape.

b. Prisoners usually are marched to the rear in a column. The guards may be "walking wounded" and not trained in guarding prisoners. Word should be passed along for each prisoner to stretch out the column. At the first bend in the road, the men in one part of the column may be out of sight of the guards.

c. If being evacuated by truck, friendly air strikes may halt the truck, thereby creating a chance to jump. If the guards are not alert, you may be able to jump out when the truck slows down while climbing a hill. Motor movements in the combat zone usually are made at night under blackout conditions. All conditions of poor or limited visibility such as darkness, rain, fog, or clouds of dust are aids to escape.

d. If being evacuated by train, you will usually be transported in freight cars and may be able to escape through windows or by making holes in the floor. If traveling in passenger coaches, escape may be possible by breaking a window and jumping when the train slows down. Before jumping, make sure your exit will be made from the appropriate side, or you may jump into the path of an oncoming train. Such escapes have succeeded in cases where one group of prisoners created a diversion by distracting guards while others escaped. A plan to overpower the guards on a car-to-car basis or to take over the whole train is possible, if the guards are lax or few in number. Disconnecting rail car couplings and setting handbrakes make it possible to separate single cars or multiple groupings of cars from trains for escape purposes.

13–6. Importance of Alertness

Always remain alert to all escape opportunities, because each one may be the last. It is your responsibility to assist others in escaping, even if it means punishment for yourself. Successful escapes have varied from the very simple to the complex. Some of the better escapes schemes have been quite simple. The earlier the escape attempt, the simpler it can be. Early attempts have the greatest chance of being successful.

CHAPTER 14

PRISONER OF WAR CAMP

Section I. ORGANIZATION AND ADMINISTRATION

14–1. General

a. Unless prisoners within a camp properly organize, they cannot hope to maintain discipline, health, and morale at a level conducive to survival, resistance to enemy indoctrination, and escape.

b. The PW camp should have an overt organization that is known to the camp authorities and a covert organization that must remain unkown to them.

14–2. Overt Organization

a. The Senior in Command. Officer and noncommissioned officer of the United States Armed Forces continue to carry out their responsibilities and exercise their authority after capture. The senior officer within a prisoner of war camp or other area where there are prisoners of war assumes command according to rank without regard to military service. If no officers are present, the senior noncommissioned officer assumes command. In the absence of both officers and noncommissioned officers, the senior enlisted man takes command. Article IV of the Code

of Conduct places responsibility of command squarely on the shoulders of the senior man. In determining the person who is senior in command, chaplains and medical and female personnel normally are excluded.

b. Prisoner's Representative. Under the 1949 Geneva Convention on the Treatment of Prisoners of War (GPW), prisoner of war organizations have some responsibility to the prisoners' representative.

(1) *Selection of prisoners' representative.* Selection or appointment of prisoners' representatives is as follows:

(*a*) In camps where there are no officers, the prisoners' representative may be elected by the prisoners in a secret ballot every 6 months. The representative appoints assistants.

(*b*) In officers' camps and mixed camps (excluding those referred to in (*c*)below), the senior officer among the prisoners of war will be recognized as the prisoners' representative. Assistants are elected. In mixed camps, assistants are selected from and elected by the prisoners of war who are not officers.

(*c*) In labor camps where officers are included solely for carrying out camp administration duties, the officers will be eligible for election as prisoners' representatives together with the other prisoners. The representative chooses assistants who are not officers.

(2) *Duties of the prisoners' representative.* The prisoners' representative has the duty to further the physical, spiritual, and intellectual well-being of the prisoners. He represents the prisoners before

military authorities of the Detaining Power, the Protecting Powers, the International Committee of the Red Cross, and any other outside organization which may assist the prisoners. To carry out this function, prisoners' representatives and assistants should set up a workable and efficient organization capable of insuring the best possible living conditions for the prisoners. The organization should also establish programs to maintain the mental and physical fitness of men.

(3) *Senior in command and prisoners' representative.* It is probable that the enemy will be aware of the U.S. Code of Conduct and the duties and responsibilities of the senior member of the U.S. Forces in the prisoner of war camp or other area where there are prisoners of war. To hamper morale and weaken any prisoner organization, the Detaining Power may, in violation of the GPW, attempt to install a cooperative prisoner of their choice as a prisoners' representative. Moreover, in camps where no officers are present, they may refuse to accept the senior man, if he is elected, and require additional elections until a weak man is selected. These tactics are designed to break down the prisoners' internal control so that they become more likely to collaborate. In these, as well as in all other situations, the senior man continues to have command responsibility, and other U.S. prisoners are subject to his lawful orders. Survival as a prisoner requires a strong organization that provides leadership, discipline, and unity of effort. If such an organization cannot be achieved overtly, it should be sought covertly.

c. Duties of Senior Prisoner. The aim of the senior prisoner and his assistants should be to set up a workable and efficient organization capable not only of insuring the best possible living conditions for the prisoners, but also of keeping the men mentally and physically fit. The need for organization is paramount—the prisoner must have some solid structure in his life to lift him above the level of mere existence. He must be made responsible to someone or for something. Therefore, various committees should be set up to deal with the general problems of camp administration, and all possible facilities should be organized for the pursuit of studies, sports, and other recreational activity. No definite rules can be made in relation to the delegation of duties, but the type organization table (fig. 14–1) provides a useful basis for study and planning.

d. Welfare Activities. Welfare plays an essential role in keeping prisoners reasonably happy. Attention to the following details will help in maintaining morale:

(1) *Messing.* Every opportunity should be taken to improve the standard of rations and the methods of cooking. Red Cross parcels must be equally distributed.

(2) *Letters and false rumors.* The importance of mail in keeping up men's spirits cannot be overemphasized. At times, however, it can have the opposite effect; and prisoners need to be cautioned against believing gossip or rumors about their wives or fiancees, and against reading wrong meanings into letters. When mail is infrequent or delayed, it does not necessarily mean that relatives are not writ-

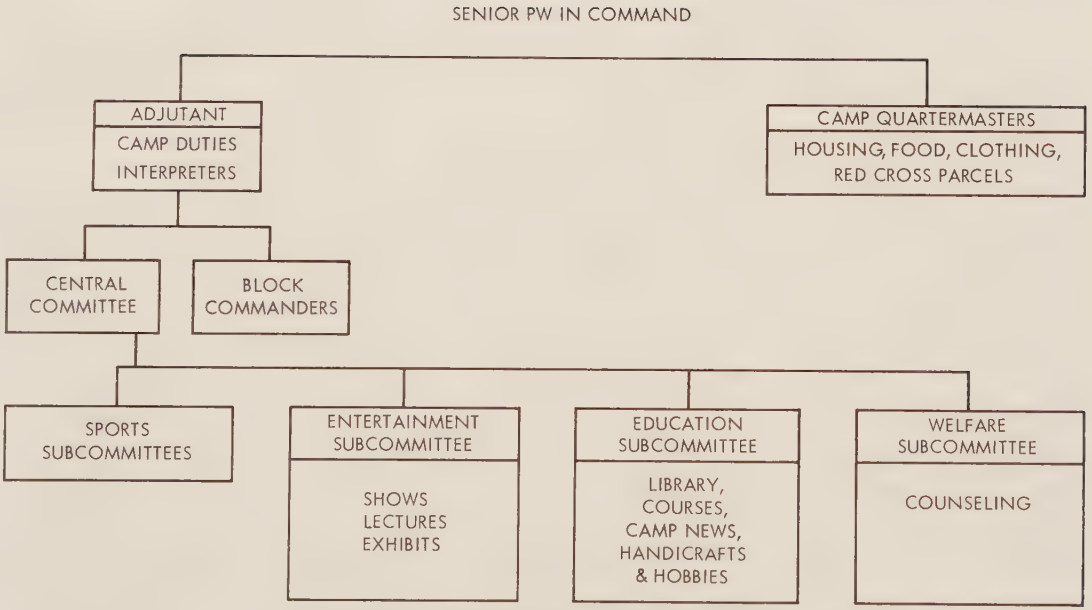


Figure 14–1. Type prisoner overt organization.

ing regularly; the more likely reason is that enemy authorities are holding back letters for purposes of their own. Outgoing mail often is a source of intelligence for the enemy. Prisoners should be instructed to keep out of the mail information which the enemy can use for interrogation and propaganda purposes. Prisoners should make an effort to limit letters to a theme of "I am alive and well."

(3) *Counseling.* Prisoners should be encouraged to talk over family and other problems with their fellow prisoners and commanders. Such sessions should be informal, and the problem viewed with sympathetic interest. The services of the camp chaplain, if there is one, should prove invaluable in matters of this kind.

(4) *Grievances.* Some men become inbued with a sense of grievance either about the war effort or about the lack of help from home. Attempts should be made to counter these grievances by stressing an appreciation of the problems in the war situation and the possible reasons for the absence of help. The prisoners may smile at the explanations and look cynical, but the words usually will not be wasted. Cynicism is often largely a surface reaction, and in their hearts men will feel that there is a lot more in what has been said than they care to admit. Although they most likely will continue to air their grievances, much of the sting will have been removed.

e. Continuity and Flexibility of Overt Operations. The administrative organization of a PW camp, or of its subdivisions, is subject to severe disruptions at any time. Disruptions can be caused by reloca-

tion of large or small groups of prisoners, by the removal or death of a commander or staff officer, or by the prison authorities arbitrarily disbanding the overt organization and appointing prisoner leaders of their choice. The commanders and staffs at all levels of the overt organization should be prepared for the disruptions by designating a firm chain of command and appointing alternate or assistant staff personnel. The latter may receive periodic or on-the-job training to insure their readiness to assume responsibility without prior notice. If the prison authorities attempt to appoint prison leaders of their own choosing, the commanders at all levels must protest this action to the prison authorities. It is the duty of all prisoners to demonstrate their loyalty to the deposed leaders and to demand, at every opportunity, their reinstatement.

f. Summary. This brief outline of the PW camp overt organization can best be summarized by presenting the essence of a statement made by one of the most notable prison camp organizers during World War II: "Keep up the fight. You are *not* out of the war. You are still a potentially effective combatant. Have faith in yourself, your country, and the Service you represent. Keep mentally and physically fit. Be tolerant. You may be hungry, dirty, ill-treated, and living under conditions of the utmost discomfort, but so are the other prisoners. Do not fight others about it, reserve your energy for the enemy. Be cooperative in all measures to help your comrades and do all in your power to work for the common good. Above all, do not pity yourself. You will be surprised how hard it is to remember the

black days when you arrive home. Only the amusing incidents will come to mind. You still belong to a great nation and you are still fighting. The reputation of your Service and your country depend on you."

14–3. Covert Organization

See FM 21–77A.

14–4. Protecting Powers

a. Protecting Powers are neutral countries which are designated by the Detaining Powers to determine if the Geneva Convention is being followed and to safeguard the interests of the countries participating in the conflict. Subject to the consent of the warring parties, the International Committee of the Red Cross may assume these functions if the Protecting Powers are unable or unwilling to operate.

b. Prisoners undergoing confinement as disciplinary punishment still have the right to complain to the representatives of the Protecting Powers about conditions of the captivity.

Section II. COMMUNIST INTERNMENT CAMPS (SEA)

14–5. General

Probably the most important training for a *potential cold war* prisoner is to know what to expect as a prisoner. The references cited in the following paragraphs describe treatment recently received by U.S. prisoners.

14–6. Viet Cong Treatment of Prisoners in the Republic of South Vietnam

See FM 21–77A.

14–7. Physical Restraint

See FM 21–77A.

14–8. Medical Treatment

See FM 21–77A.

Section III. SURVIVAL WHILE IN PRISONER STATUS

14–9. The Will to Survive

There is nothing more important to survival than the will to live and resist. Regardless of the location, the poor living conditions, and brutalities the enemy authorities might impose, *if you make up your mind to endure it, you will succeed.* Your chances of survival as a prisoner or as an evader will be much greater if you—

a. Exercise leadership responsibilities.
b. Maintain military and self-discipline.
c. Keep up individual and group morale.
d. Participate fully in group survival activities.
e. Recognize and control fear.
f. Eat anything edible.
g. Nourish the sense of humor.
h. Practice survival, first aid, and preventive medicine.
i. Maintain the will to survive.

14–10. A Plan for Survival

Since the conditions in various countries and PW camps differ, it is impossible to provide a specific survival plan for each situation. A plan, however, is required to make the best of what is available.

Here is one such plan that can be remembered by the word S–A–T—Save, Add to, Take care of.

a. Save. What can you *save* in a PW camp? Everything—clothing, pieces of metal, cloth paper, and string. A piece of twine may mean success or failure when it comes time to break out. Hide these items under the floor or in a hole in the ground. If they are discovered, they may appear harmless and you may receive little or no punishment.

(1) Wear as few clothes as possible. *Save* your shoes, underwear, shirts, jacket, and other items of clothing that will afford protection from the elements when you begin the trip back.

(2) Save any nonperishable food that is supplied by the Red Cross or your captors. Candy, for example, comes in handy as a quick source of energy when traveling. If no other candy source is available, save each issue of sugar given you by the enemy. When enough is available, boil it down into hard candy and *save* it to build up a supply. Canned food is ideal for storing. If the enemy punctures the cans, however, to prevent hoarding, you may still preserve this food by resealing the cans with wax or some other field expedient. It may be possible to save this food by recooking it and changing its form. Other food to hoard for the day of the escape include suet and cooked meat, nuts, and bread.

(3) *Save* pieces of metal regardless of how insignificant they may seem. Nails and pins can serve as buttons or fasteners. Old tin cans are excellent for improvised knives, cups, or food containers. If you have a razor blade, guard it and use it for shaving only. Devise ways of sharpening it—rub it on glass

or stone or some other hard surface. A clean shave is a good morale booster.

(4) *Save* your strength but keep active. A walk around the compound or a few mild calisthenics keep the muscles toned. Get plenty of sleep because you will not get much rest on your way back.

b. Add To.

(1) Use your ingenuity. Select those items that you cannot do without and supplement them; for example, rations. Many edibles can be found in and around the compound. When allowed freedom of movement within the compound, look for natural food native to the area. See chapters 4 and 6 for a discussion of edible food. If possible, *add* these roots, grasses, leaves, barks, and insects to your escape cache. They will keep you alive when no other food is available.

(2) Clothing should be supplemented so the more durable garments are in good repair when you escape. A block of wood and a piece of cloth make good moccasins and save the boots. Rags can substitute for gloves; straw can be woven into hats. Salvage clothing from the dead.

c. Take Care of. Probably the most important part of any plan for survival is the "take-care-of" phase. Maintain what you have. There will not be any reissue when the shoes wear out or if your jacket is lost. It is also easier to maintain good health than to regain it.

(1) Put some clothing into your escape cache. Watch the rest for early signs of wear and repair it with improvised material, if necessary. A needle made from a thorn, nail, or splinter and threaded

with unraveled cloth, can mend a torn pair of trousers. Wood, canvas, or cardboard bound to the soles of the shoes will save them from wear. Even paper will suffice as a reinforcing insole if your shoes wear through.

(2) Good physical health is essential to survival under any circumstances. It is especially important in a PW camp where living conditions are crowded, and food and shelter are inadequate. Every means possible must be used to keep yourself well.

(*a*) Soap and water are a basic preventive medicine; keep clean. If water is scarce, collect rain water, use dew, or simply rub yourself daily with a cloth or your bare hands. Pay attention to areas on the body that are susceptible to rash and fungus infection—between the toes, the crotch, and the scalp.

(*b*) The cleanliness rule also applies to clothing. Use soap and water when they can be spared. Hang your clothes in the sun to air if soap and water are not available. Examine the seams of the clothing and hairy portions of the body frequently for lice and their eggs. Disease-infected lice can cause death. A possible way to get laundry service or even a bath is to tell the guard that you are infested with lice, whether or not the complaint is true. The prison authorities, fearing that lice on prisoners may cause an outbreak of louseborne diseases among the civilian population, might provide this service.

(*c*) If you become ill, report your condition to the camp authorities. The chance that you will receive aid is worth the try.

CHAPTER 15

ENEMY INTERROGATION

15–1. Purpose

This chapter discusses previous experiences with enemy interrogation and suggests techniques for coping with these situations.

15–2. Conduct of Prisoner During Interrogation

The first line of defense against interrogation and later indoctrination is military bearing, silence, and trust in yourself, your Army, your country, and your religion. The following points will help in resisting enemy interrogation:

a. Give only name, rank, service number, and date of birth.

b. Be respectful during interrogation, but do not give the impression of willingness to cooperate through "politeness." Such an idea, once planted in the mind of the enemy, may prolong the interrogation.

c. Act ignorant of having information which may be useful to the enemy.

d. Beware of "stool pigeons" and prison camp medical personnel who may be used extensively to collect information.

e. If knowledge of the enemy's language will in-

crease chances of a successful escape; neither disclose nor admit this ability during interrogation.

f. Do not believe statements by the enemy that other prisoners have talked. This is a common interrogation procedure to catch you off guard and to encourage you to talk.

g. Avoid looking the interrogator directly in the eye. This may reveal information without a direct answer. Pick out a spot between the interrogator's eyes or on his forehead and concentrate on it.

h. While being interrogated, be courteous but firm in refusal to give information. Salute all officer interrogators senior to you.

i. Never give information about other prisoners. If the name of a fellow prisoner is mentioned during interrogation, report the name and circumstances about the enemy's interest to your superior; this individual may be under surveillance and will, in turn, be interrogated about your conversation.

j. Beware of the temptation to impress interrogators by boasting of exploits either true or invented.

k. Do not be tricked into filling out innocent looking questionnaries or writing statements which require more than name, rank, service number, and date of birth.

l. Do not attempt to deceive the enemy by volunteering false information. A skilled interrogator will be able to extract the information he needs once you start talking on the subject.

CHAPTER 16

ENEMY INDOCTRINATION

16–1. Purpose

The purpose of this chapter is to discuss enemy indoctrination methods with PW and the defenses that can be used to resist this indoctrination. The methods described are based on past experiences of U.S. prisoners in the hands of communists.

16–2. Communist Indoctrination Program

Most communist forces, in addition to their military objectives, have the mission to cause prisoners to believe in their form of government. They attempt to disturb the frame of mind of the prisoners, to shake their faith in their government, to question the intentions of their government, and ultimately, to believe that the communist form of government is the best. The indoctrination mission is well supported by an organized and disciplined program of teaching and instruction. It is well planned, efficient, and administered by trained personnel some of whom were educated in the United States.

16–3. Objectives

a. Basically, the indoctrination program has two main objectives. The first is to completely indoctri-

nate a small, select group of prisoners in the theory and practice of communism as an ideal form of government. The second objective is to undermine the faith and trust of other prisoners in their country, their government, and its political leaders—not to make communists out of all the prisoners.

b. To achieve the first objective, the communists select the prisoners on whom they feel they can depend; give them special training, tutoring, and counseling, and extend them special treatment. This is in keeping with the communist concept that a small, select, disciplined group should lead the masses. As an incentive to apply themselves, these prisoners are promised positions of leadership in the United States—after a communist-directed revolution replaces the democratic system with a communist form of government.

c. To achieve their second objective, the communists smear the United States by distorting minor faults in our political and economic institutions. Discussion of the true democratic principles of the U.S. Government is not permitted. While attacking American concepts of democracy, the communists launch attack after attack against American statesmen by name, claiming that they are the chief causes of war and evil.

d. The communists feel that if they can succeed in subverting your loyalty, you will be less opposed to communism after repatriation to the United States and will be more sympathetic to any communist conspiracy against the United States. Part of their plan calls for the indoctrinated prisoners, upon their return to the United States, to assume leader-

ship of the subverted ex-prisoners and urge them to support the communist conspiracy and/or the communist party.

16–4. Other Objectives

a. In support of these two main but general objectives, there are specific objectives. To facilitate internal control of the prisoner population, the communists organize a net of informers to relay to the camp authorities information concerning the activities of other prisoners. Through informers the enemy is able to break up many escape attempts. Informers also are expected to furnish information concerning prisoners who are actively resisting indoctrination.

b. Another objective is to recruit collaborators to assist in the indoctrination program. These collaborators give propaganda lectures, write articles, and talk other prisoners into signing "peace petitions," surrender leaflets, and other types of propaganda.

c. Still another objective is to recruit potential agents to perform espionage or subversion activities for the communists after repatriation. During the Korean conflict, the few prisoners who agreed to this plot realized soon after their repatriation that they had been duped and notified U.S. authorities.

16–5. Phases of Indoctrination

The indoctrination program is administered in two general phases: the preparatory and the implementation.

a. Preparatory Phase. This phase, a "softening-up" or "conditioning" process, consits of a series of

lectures on the imperfections of the United States Government. The U.S. Government and its economic and political systems are the main target for all lectures. During this phase, the United States is accused of causing the war.

b. Implementation Phase. This phase of indoctrination is devoted to selling communism as a way of life which is superior to the democratic system. The communists use an old technique during this phase—comparing one with the other, pointing out the favorable aspects of communism and emphasizing the so-called "defects" of democracy. The enemy pictures the communist state as a state in which every man, woman, and child lives a life of happiness that is free of poverty and class discrimination.

16–6. Techniques Used

a. Repetition. This technique is used against all prisoners during their captivity. Some prisoners, yielding to pressure, memorize certain material and are questioned and examined on it for days, weeks, and months. They are asked to answer the same questions over and over again. They are required to read and reread communist propaganda endlessly. By repetition, the enemy causes some prisoners, especially those with a relatively poor formal education, to memorize lengthy works on communism and economics. As a result of this technique, some prisoners with only a grammar school education, are able to recite long essays on communism and its economic and political theories without understanding the content of the material.

b. Harassment. This technique, like repetition, is employed on an exact schedule that does not vary from day to day, week to week, or month to month. Its purpose it to create a state of anxiety—to keep you tense and constantly uncertain. It is also conducted in such a way as to make you believe that harassment will end eventually, and that you will then be able to live as normally as possible in prison. Harassment usually is based on false charges against prisoners. These charges could be anything from a very minor infraction of the rules to a major offense, such as striking an enemy officer. It works best on, and is designed for, prisoners who commit minor offenses in connection with the indoctrination program.

c. Humiliation. Humiliation is used against prisoners who demonstrate a great deal of personal pride. Its objective is to break down your personal pride by making you look ridiculous in the eyes of the other prisoners—to provoke shame and embarrassment. To assure its effectiveness, it is used primarily in the presence of other prisoners.

16–7. General Results

The results of communist indoctrination must be appraised in the light of its objectives. The communists do not attempt to convert every prisoner. They want to indoctrinate a select few whom they can trust to accept communism as a way of life. These later could develop into communist revolutionists. Primarily, the communists want to destroy, or at least reduce, the hostility felt by the prisoners toward the communist cause. They plant seeds of

doubt which they hope will grow and produce an attitude of "seeing both sides" of communism, observing some "good" points here and there. Indoctrination weakens the old beliefs of some prisoners, confuses other prisoners, and frustrates still others. The communists hope that, besides indoctrinating some prisoners, they will cause others to see merit in some aspects of communism and not to visualize communism as a threat to democracy and the political institutions of the United States.

16–8. Indoctrination by the Viet Cong

Indoctrination methods and techniques used by the Viet Cong in Vietnam are described in FM 21–77A.

16–9. Defense Against Indoctrination

Rules for defense against enemy interrogation apply equally as well to defense against indoctrination. If the interrogator cannot induce you to give information other than name, rank, service number, and date of birth, then indoctrination obviously is impossible. If uncooperative, you are considered poor material for indoctrination. Confidence in yourself, your family, your unit, your country, and your religion serves as a very effective defense against indoctrination. Above all, the will to survive must be retained.

CHAPTER 17

ESCAPE FROM PRISONER OF WAR CAMP

Section I. GENERAL

17–1. Escape

Capture by the enemy does not terminate your usefulness. You are duty bound to make and to take opportunities to escape. Through resistance and attempting to escape, you continue the battle as an active soldier and may also—

a. Gain freedom and avoid the miseries of confinement.

b. Collect military information during escape and evasion travel.

c. Require the enemy to augment his guard personnel and to send out search parties.

d. Disrupt the enemy's PW camp administration.

e. Create a nuisance that lowers enemy military and civilian morale.

f. Add to U.S. manpower resources.

17–2. Planning an Escape

See FM 21–77A.

Section II. ESCAPE TECHNIQUES

17–3. General

a. The prisoner covert organization has in impor-

tant role in any escape attempt. It is unlikely that you can succeed by your own efforts alone. For the escape to succeed, diversions usually must be planned; ladders may have to provided, then whisked away and disposed of; and numerous escape items such as documents, money, compasses, and food may be required. Providing these is an important function of the PW covert organization.

b. The techniques to be utilized in an escape depend largely on the particular conditions of captivity. You may be confined by walls and barbed wire barricades, or simply by a vast area of unfriendly territory. Some of the techniques of overcoming physical barricades are discussed below.

17–4. Tunneling

a. Tunneling as a means of escape is difficult and requires many favorable conditions. First of all, many prisoners, especially those who must work long and difficult hours, will be unable to meet the physical standards required for later evasion. Second, tunnel construction takes a long time which increases the risk of discovery. Third, a tunnel is seldom, if ever, a one-man affair. Large numbers of personnel normally have knowledge of its existence; thus the possibility of compromise exists from the very beginning. Also, tunneling is virtually impossible in certain types of earth such as marshy, frozen, or extremely sandy soil.

b. In addition to escape routes, tunnels may serve a variety of other purposes. They may be used to link separate compounds, establish clandestine communications, and penetrate sources of enemy supplies.

c. Tunnel operations require maximum security, with the greatest security need at the openings. This is especially true of tunnels used for communication purposes.

d. A major problem in tunnel digging is dirt disposal. In most cases, the dirt removed from a tunnel is different in color from the surface earth. To dispose of it, carefully blend it with the soil in and around the compound.

e. Dirt may be secreted in the walls of a building, but care must be taken to avoid any seepage of dust through the cracks that could lead to discovery. If possible, move tunnel dirt outside the camp for disposal. This may be done by work parties leaving the compound daily. They may also bring back into camp shoring material and other essentials for construction.

17–5. Over Wall or Wire Barricades

a. The route which takes you over the barricade is extremely difficult. It has been accomplished by pole vaults, by collapsible ladders, and also by a gymnast tossing his partner over a wall. Such an escape requires careful planning and nearly perfect conditions and surprise during the escape.

b. The chances of success in over-the-barricade escape are multiplied by using the cover of darkness and inclement weather. As in all escape attempts, there must be coordination with the covert organization for both permission and support.

17–6. Through Walls or Wire Barricades

a. Escape through walls or wire has been successfully accomplished many times; however, the enemy

can make this method of escape all but impossible by placing mines or concertina wire outside the wall or between doubled barbed wire fences.

b. The best way through a wall or fence is the gate. There are many ruses which may be used to leave a PW camp in this manner. The ability to bluff is a primary factor. A word of caution—any bluff used when escaping or evading, must be a 100% bluff—99% is not good enough. The disguise may be perfect, the timing right, but one wrong glance, or a hasty walk when an unhurried one is called for, can result in failure.

Section III. ESCAPE DEVICES

17–7. General

a. Escapes require a variety of tools. Tools stolen from guards or working parties may lead to serious reprisals. Also, the quantity and type procured in this fashion rarely are adequate for requirements. Improvisation therefore becomes extremely important.

b. There are usually several craftsmen, artists, and handy men among most groups of prisoners. Organize and use their skills to make escape devices.

17–8. Tools

a. Usable raw materials are needed for the production of tools. Many usable materials such as nails, screws, brackets, hinges, angle irons, rods, timber, metal cans, clothing, wire, glass, paper, and adhesive can be found in a PW camp.

b. After locating various items needed for tool

production, consider converting this raw material into a usable collection of tools. The only limitation is the ingenuity and skill of the individual prisoners. Some tools useful for escape purposes are files, saws, drills, chisels, wire cutters, digging tools, knives, graters, fishhooks, hammers, hatchets, and pliers. With enough talent, ingenuity, and common sense, all of these tools can be fabricated.

Section IV. ESCAPE DOCUMENTATION

17–9. General

Escape is only the first phase in a bid for freedom. After escape, the problem of moving through hostile territory to a point of safety sometimes many miles away must be considered. Two courses of action exist: to travel cross-country during darkness, avoiding contact with the enemy; or to travel in disguise, risking detection. If you speak the indigenous language and use a disguise, you need certain documents to assist your movement. For this reason, necessary documents must be made available.

17–10. Identity Documents

a. Identity cards are required in wartime. It may be difficult to obtain genuine documents of this nature because the loss of a pass, permit, or identity card by an enemy national is regarded as a serious offense, and trading in documents is discouraged by the threat of harsh punishment.

b. Stealing camp passes rarely is possible. The theft of a pass from a prison guard may be followed by vigorous reprisals or immediate recall and change of all camp passes, thus rendering a stolen pass use-

less. Occasionally, however, a guard may want to sell the pass of a dead relative or friend. It may be possible to steal or borrow documents long enough to copy the wording and general layout. Some identity documents are—

(1) *Gate passes.* Gate passes may range from colored sheets of paper carried by the guard personnel to elaborate identity cards issued to security officials. The latter type usually contains a photograph of the individual.

(2) *Identity cards.* Normally, identity cards of foreign soldiers are represented by their pay books. Pay books are seldom examined in detail, and because they generally are worn and dirty through constant use, it may not be necessary to forge more than the cover and first page. Civilian identity cards vary according to the sex, occupation, and nationality of the holder, and they may restrict travel to specific areas.

(3) *Letters of recommendation.* In many foreign countries, persons moving from one town to another carry letters of recommendation which may contain the reasons for travel. These documents, usually with imposing letterheads and impressive stamps, are sometimes issued by business concerns for use of traveling personnel. Due to the variety of these documents and the considerable latitude in forging them the names of large business concerns may be used to lessen the chances of detection.

(4) *Miscellaneous passes.* Temporary identification documents are issued to persons who lose permanent passes, travel permits, and change of residence permits. These papers normally are typewrit-

ten and vary from district to district. Any well worded and imposingly stamped document should serve the purpose.

17–11. Methods of Production

a. The time required to forge documents depends on the size, number of pages, quantity and style of lettering, and the conditions under which they are produced. The equipment available will normally be inadequate, usually being limited to pencils, ink, and inferior nibs and brushes. Some paints and improvised drawing instruments may be available, however, and wood or coal ash can be mixed to obtain shades of color from dark brown to light tan. These may be used to stain paper to give it the appearance of age.

b. Printed documents may be reproduced as follows: place a sheet of window glass over the document to be copied; make a tracing of the lettering in white paint and let it dry; then turn the glass over and retrace the white tracing with a slow-drying black ink or paint. Use this method to print a copy of the document. Make additional copies by cleaning off the black paint and repeating the process.

c. If a typewriter is available, make an improvised stencil by typing on paper without using the ribbon, so that the type punctures the paper slightly. Then, by using an improvised inking roller on a pane of glass, numerous copies can be made before the stencil tears. The printing is seldom perfect, but it can be retouched by hand.

17–12. Maps

Available maps normally may be only small-scale

maps that have been smuggled into the camp or copied from books or newspapers in the camp library. Maps are invaluable aids in planning escapes, and every effort should be made to procure or prepare them. Maps may be obtained from guards or visitors through bribery. It is desirable to have maps of the immediate area, of the roads and railways between the camp and the final destination, and of the frontier zone and its approaches. Once obtained, maps should be reproduced for future use by other escapees. Possible ways to produce copies are—

a. Trace the map onto another sheet of paper using carbon paper or such substitutes as coating the back of the map with any high-carbon substance such as charcoal or graphite from a pencil. Also, place a blank sheet of paper over the map and hold it to the light, against a pane of glass, and trace. This method is slow and the original map may be damaged after only a few reproductions. Also, reproduction from copies made in this manner tends to produce errors.

b. Another type of reproduction is possible by using gelatin which may be available in the camp kitchen. Wash the gelatin in warm water, then heat it until it becomes liquid. Poor it into a pan or tray of a suitable size and allow it to cool. Using indelible ink, made by dissolving indelible pencil lead in water, make a master copy of the map. Place this copy on the gelatin so that the gelatin surface absorbs the ink. Produce copies by placing thin sheets of paper on the gelatin, rolling the sheets with a smooth object to transfer the impression, and then carefully lifting the printed sheets. The number of copies that

can be produced will vary with the materials used, but about 25 satisfactory copies can normally be made. The gelatin can be washed, melted, cooled, and used again.

c. Wooden block printing may be employed. Rubber shoe heels will provide a good substitute for a wooden block. Trace or draw the map in reverse on the block. Carve the wood surrounding the image, leaving the traced lines as the original surface of the block. Then cover the image lines on the block with any greasy ink, or ink in a flour paste (rice or wheat) base. Press a sheet of paper or cloth against the block and transfer the image.

17–13. Photographs

Most identity cards and passports carry photographs. It may be difficult to obtain photographs in the camp, but a good likeness seldom is necessary on an identity card. If the photograph is of the right size, appears in the correct position on the document, and carries an official-looking stamp and signature, it should pass ordinary train or roadblock checks. To simplify the problem of photography, try to obtain a camera and accessories. Visiting officials may possess cameras or photographs which can be pilfered. Improvising a camera may be necessary. The main difficulty faced is the developing and printing of films, but bribery may provide a solution.

17–14. Official Stamps

Most foreign documents bear official stamps. Use a rubber shoe heel to make a stamp by cutting out in reverse the outline of the seal or lettering with a

razor blade. If a piece of linoleum, part of an inner tube, or a wooden block is available, cut it to resemble an official stamp. Potatoes have been used as a substitute for rubber. If a genuine document can be obtained, an impression of its rubber stamp can sometimes be transferred to a forged document. Do this by pressing a damp piece of paper against the genuine impression, thus getting a reversed impression. Then transfer the impression to the forged document and touch up as necessary.

17–15. Casting

Frequently the duplication of buttons, insignia, seals, medals, etc., is necessary to complete an evasion disguise. Casting these items in soft metal generally is the best method, and the procedures involved require very simple materials.

a. Lead, solder, and zinc are the easiest and most common materials to work with. Lead can be obtained from pipe or plumbing fittings, from around underground electrical wire, and from leaded window frames. Solder may be melted from the seams of tin cans. Zinc frequently is used on washbowls, metal fittings, metal containers, and some window and roof construction.

b. Make a mold by using clay, soap, or a large potato. The material used is cut in half, and half of the design is cut into each piece so that when fitted together the hollowed-out parts will have the form desired. In all molds, a hole must be made in one side through which to pour the metal; a small hole is made in the other side to allow air to escape. Molds made of clay should be baked to harden. After being

poured and allowed to cool, finish the casting by trimming with a knife or file and painting or polishing as appropriate.

17–16. Clothing

Under certain circumstances, civilian clothing may be useful. Travel as an enemy soldier is difficult due to military restrictions and controls. Civilian disguises have worked in the past. The presence of numerous foreign workers in various styles and conditions of clothing make it possible to use parts of the regular uniform. Tailor and dye service trousers, coats, and caps to make satisfactory substitutes. Permanganate of potash, iodine, gentian violet (obtained from the dispensary), indelible lead, ink, coffee, tea, and colored book covers can be used as dyes. Chloride of lime, often found in camp toilets, is a useful bleaching agent. Pistol holsters, pouches, and belts can be made from paper and cardboard, glue, stain, and polish. Dummy pistols, rifles, and bayonets can be carved out of wood. Paper can be used to make paper-mache weapons, holsters, or other items. Do this by boiling the paper to a thick pulp, then cooling and adding an adhesive material such as flour. When partially dry, work it into the desired shape. Use improvised coloring material to give an appearance of genuineness to the article.

Section V. COVER-UP AT ROLL CALL

17–17. General

a. Once an escape has been made, the chances of success are greatly increased if knowledge of the es-

cape can be kept from the enemy guards. The best time to escape is at night just after the last roll call, since the next roll call usually will not be held until morning. This gives the prisoner a head start of several hours before the guards detect the break. If the absence can be covered up at roll call for several days, you gain even more time.

b. If the absence is undetected and security and local police forces are not alerted, advantage can be taken of many situations such as the changing of guards, curfew restrictions, bridge crossings, and ferry departures. It may even be possible, in disguise, to board a train near the camp.

c. Cover-up of the escape also allows other prisoners to use the same escape plan. Once an escape is discovered, however, the enemy makes every effort to determine the method of escape and takes appropriate countermeasures.

d. The roll call cover-up should be part of the escape plan. If it fails, the escape may collapse.

17–18. Methods of Covering Up

The methods used to cover an escape may vary according to existing conditions. Substitution is the most common device employed, although delay of short duration may be achieved simply by causing confusion or miscounting during the roll call, particularly in large camps. Some ruses that have proved successful in the past may be effective.

a. If a roll call is taken in ranks, outdoors, it may be possible to slip a prisoner who had already been counted into your empty spot. Alternating short and tall men and forming in slightly ragged but close

formations will aid in the deception attempt.

b. If inclement weather forces the roll call to be held indoors and the count is taken room by room, it may be possible for a counted prisoner to slip into your room. A trap door might be constructed between rooms for this purpose.

c. Discovery of absences during bed checks may sometimes be avoided by placing a dummy in the bed. The bed should be a top bunk in a corner of the room and behind a table or other obstruction where a lazy guard is likely to make only a casual check.

d. Substitutions may be feasible between compounds within a camp if roll calls are not held simultaneously and if passage between compounds is possible. Individuals such as mess or hospital personnel or hospital patients who normally are free of rigid control may take your place for several hours or longer.

e. Group escapes present a different problem for the cover-up operation. Since cover-up cannot be accomplished satisfactorily in all cases by substitution, it may be possible to temporarily deceive the enemy as follows: several months before the scheduled group escape attempt, a number of prisoners can occasionally hide themselves at roll call, presumably only for nuisance purposes. They should hide in places that provide them cover for several hours or longer. In time, the enemy accepts these antics as nuisance tactics and does not alert area security forces to be on the lookout for escapees. Thus, at the time of the actual escape, the escapees may have several hours of relative freedom before

the ruse is discovered and an accurate roll call is taken. Of course, this type of cover-up operation disrupts camp routine for all the prisoners, and it is especially unrewarding to the prisoners who volunteer to hide and are subsequently punished. But it may mean successful evasion for some of the escapees—and this is the primary consideration.

APPENDIX A

REFERENCES

AR 350–30	Code of Conduct.
AR 350–225	Survival, Evasion and Escape Training.
FM 5–13	The Engineer Soldier's Handbook.
FM 5–20	Camouflage.
FM 21–11	First Aid for Soldiers.
FM 21–20	Physical Training.
FM 21–26	Map Reading.
FM 21–41	Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
FM 21–60	Visual Signals.
FM 21–75	Combat Training of the Individual Soldier and Patrolling.
(S) FM 21–77A	Joint Worldwide Evasion and Escape Manual (U).
FM 27–10	The Law of Land Warfare.
FM 31–20	Special Forces Operational Techniques.
FM 31–21	Special Forces Operations.
(S) FM 31–21A	Special Forces Operations (U).
FM 31–25	Desert Operations.
FM 31–30	Jungle Training and Operations.
FM 31–60	River-Crossing Operations.
FM 31–70	Basic Cold Weather Manual.
FM 31–71	Northern Operations.
FM 31–72	Mountain Operations.
DA Pam 20–151	Lectures of the Geneva Conventions of 1949.

DA Pam 21–81	Individual Training in Collecting and Reporting Military Information.
DA Pam 30–101	Communist Interrogation, Indoctrination, and Exploitation of Prisoners of War.
ASubjScd 7–10	Land Navigation.
ASubjScd 21–4	First Aid.
ASubjScd 21–12	Survival, Evasion, and Escape.
ASubjScd 21–15	Code of Conduct.
ASubjScd 21–40	Land Navigation by Dead Reckoning and Basic Map Reading.
ASubjScd 30–23	Informants.
ASubjScd 31–24	Fieldcraft and Survival.
TB MED 81	Cold Injury.
AF Manual 64–3	Survival.
AF Manual 64–5	Survival.

Aviation Training, Office of the Chief of Naval Operations, U.S. Navy, "How to Survive on Land and Sea," Copyright 1943, 1951 by the United States Naval Institute.

APPENDIX B

WILD PLANT FOOD

B–1. Roots and Other Underground Parts

These starch-storing foods include tubers, root stalks, and bulbs.

a. Tubers. All tubers are found below the ground and must be dug. Cook them by boiling or roasting (para 4–6).

(1) *Wild potato.* This is an example of an edible tuber. The plant is small and found throughout the world, especially in the tropics (fig. B–1). This type potato is poisonous when eaten uncooked.

(2) *Soloman's-seal.* Tubers of Soloman's-seal grow on small plants and are found in North America, Europe, Northern Asia, and Jamaica. Boiled or roasted, they taste much like parsnips (fig. B–2).

(3) *Water chestnut.* The water chestnut is a native of Asia, but it has spread to both tropical and temperate areas of the world, including North America, Africa, and Australia. It is found as a free-floating plant on rivers, lakes, and ponds. The plant covers large areas wherever it grows and has two kinds of leaves—the submerged leaf, which is long, root-like, and feathery; and the floating leaves, which form a rosette on the surface of the water. The nuts borne beneath the water are an inch or two

Figure B–1. Wild potato.

Figure B–2. Soloman's-seal.

broad with strong spines that give them the appearance of a horned steer. The seed within the horny structure may be roasted or boiled (fig. B–3).

(4) *Nut grass.* Nut grass is widespread in many parts of the world. Look for it in moist sandy places along the margins of streams, ponds, and ditches. It grows in both tropical and temperate climates.

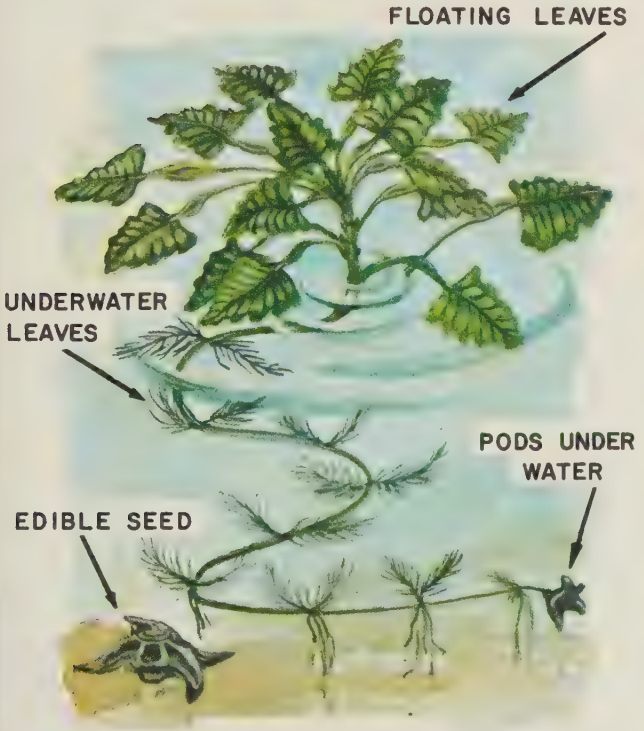


Figure B–3. Water chestnut.

Nut grass differs from true grass in that it has a three-angle stem and thick underground tubers that grow one-half to one inch in diameter. These tubers are sweet and nutty. Boil, peel, and grind them into flour. This flour can be used as a coffee substitute (fig. B–4).

Figure B–4. Nut Grass.

(5) *Taro.* The taro grows in moist, forested regions of nearly all tropical countries. This large, smooth skinned ground plant has long, wide (heart shaped), single pointed, light green leaves which grow singly from the main trunk. The flower is 4 inches in diameter, tulip shaped, and yellow-orange in color. It has an edible tuber growing slightly below ground level. This tuber *must* be boiled to destroy irritating crystals. After boiling, eat the tuber like a potato (fig. B–5).

b. Roots and Rootstalks. These plant parts are storage devices rich in starch. Edible roots are often several feet long and are not swollen like tubers. Rootstalks are underground stems, and some are several inches thick and relatively short and pointed. Following are illustrations showing both edible roots and rootstalks:

(1) *Bulrush.* This familiar tall plant is found in North America, Africa, Australia, East Indies, and Malaya. It is usually present in wet swamp areas. The roots and white stem base may be eaten cooked or raw. (fig. B–6).

(2) *Ti plant.* This plant is found in tropical climates, especially in the islands of the South Pacific. It is cultivated over wide areas of tropical Asia. In both the wild and cultivated state, it ranges from 6 to 15 feet in height. It has large, coarse, shiny, leathery leaves arranged in a crowded fashion at the tips of the thick stems. The leaves are green and sometimes reddish. This plant grows a large plume-like cluster of flowers that usually droops. It bears berries that are red when ripe. The fleshy rootstalk

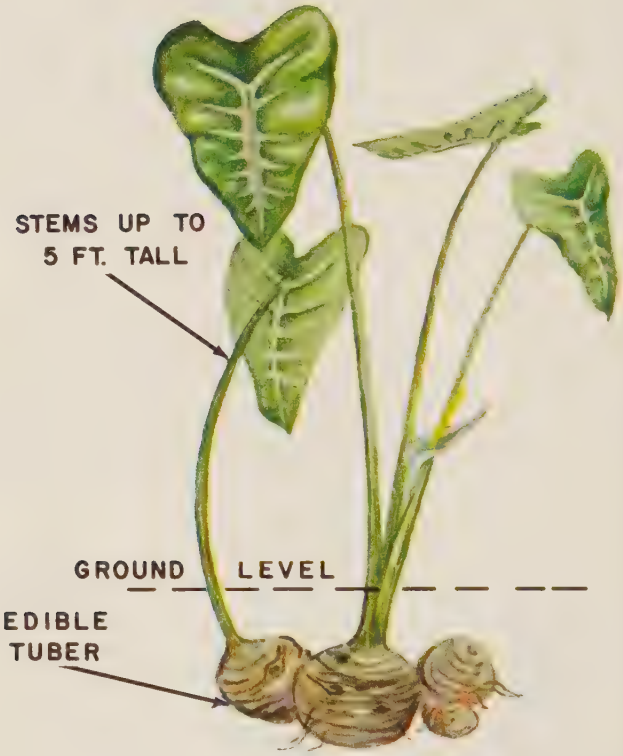


Figure B–5. Taro.

is edible and full of starch, and should be baked for best results (fig. B–7).

(3) *Water plaintain.* This white flowered plant is found most frequently around fresh water lakes,

Figure B–6. Bulrush.

ponds, and streams where it is often partly submerged in a few inches of water. It is usually abundant in marshy areas throughout the north temperate zone and has long-stalked, smooth, heart-

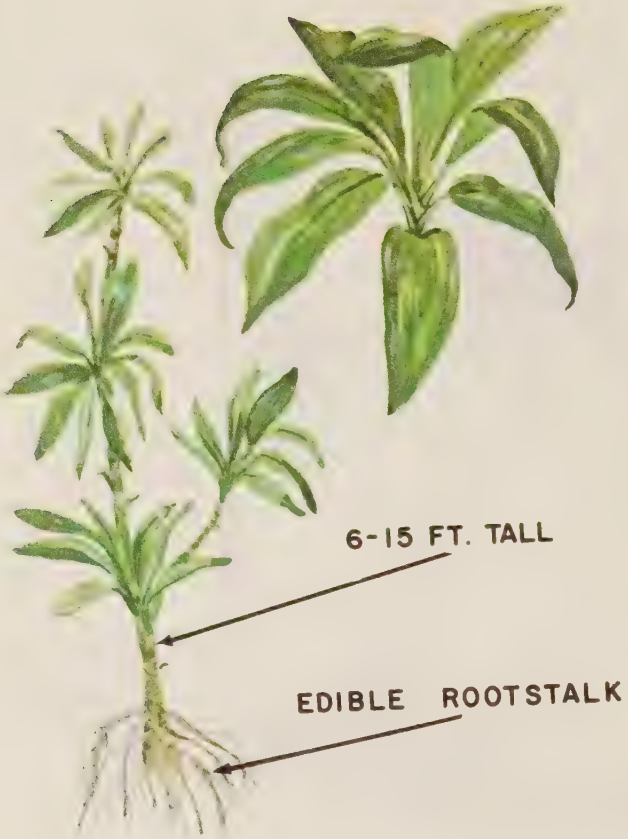


Figure B–7. Ti plant.

shaped leaves with 3 to 9 parallel ribs. Thick, bulb-like rootstalks which grow below the ground lose their acrid taste after being dried. Cook them like potatoes (fig. B–8).

(4) *Flowering rush.* The flowering rush grows along river banks, on the margins of lakes and ponds, and in marshy meadows over much of Europe and temperate Asia. It grows in Russia and much of temperate Siberia. The mature plant, usually found growing in a few inches of water, reaches a height of three or more feet and has loose clusters of rose-colored and green flowers. The thick, fleshy underground rootstalk should be peeled and boiled like potatoes (fig. B–9).

(5) *Tapioca.* The tapioca or manioc plant is found in all tropical climates, especially in wet areas. It grows to a height of 3 to 9 feet and has jointed stems and finger-like leaves. There are two kinds of manioc that have edible rootstalks—bitter and sweet. The bitter manioc is the common variety in many areas and is poisonous unless cooked. If a rootstalk of bitter manioc is found, grind the root into a pulp and cook it for at least one hour. Flatten the wet pulp into cakes and bake. Another method of cooking this bitter variety is to cook the roots in large pieces for one hour, then peel and grate them. Press the pulp and knead it with water to remove the milky juice. Steam it; then pour it into a plastic mass. Roll the paste into small balls and flatten them into thin cakes. Dry these cakes in the sun, and eat them baked or roasted. Sweet manioc rootstalks are not bitter and can be eaten raw, roasted as a vegetable, or made into flour. You can use this flour to

Figure B–8. Water plantain.

Figure B–9. Flowering rush.

make dumplings or the cakes described above (fig. B–10).

(6) *Cattail.* The cattail is found along lakes, ponds, and rivers throughout the world, except in the tundra and forested regions of the far north. It grows to a height of 6 to 15 feet with erect, tape-like, pale-green leaves one-quarter to one inch broad. Its edible rootstalk grows up to one inch thick. To prepare these rootstalks, peel off the outer covering

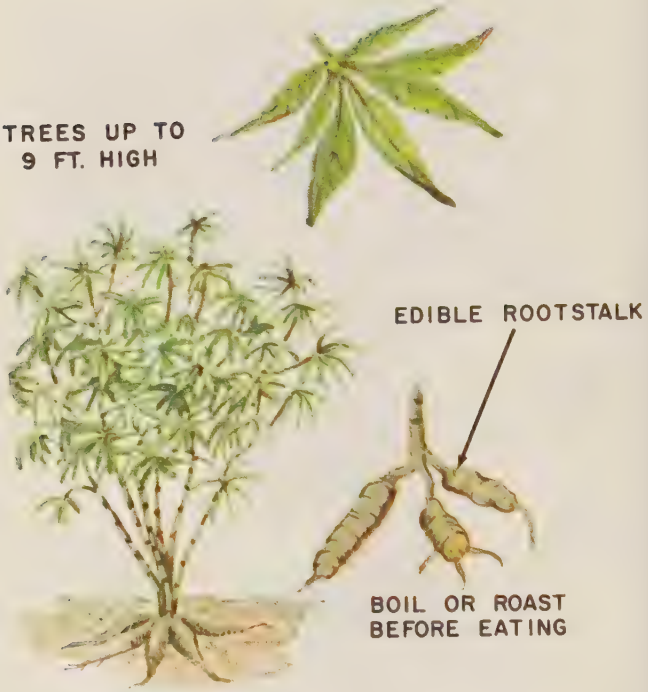


Figure B–10. Tapioca.

and grate the white inner portion. Eat them boiled or raw. The yellow pollen from the flowers can be mixed with water and steamed as bread. In addition, the young growing shoots are excellent when boiled like asparagus (fig. B–11).

c. Bulbs. All bulbs are high in starch content and, with the exception of the wild onion ((1) below), are more palatable if they are cooked.

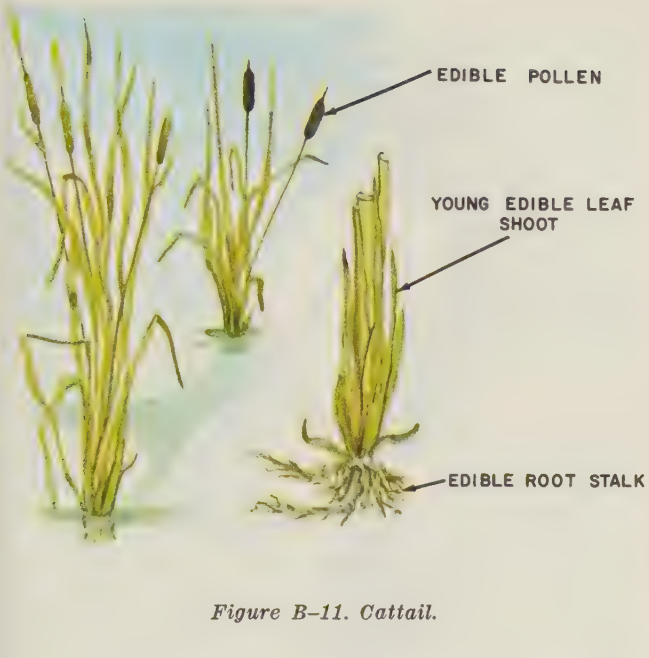


Figure B–11. Cattail.

(1) *Wild onion.* This is the most common edible bulb and is a close relative of the cultivated onion. It is found throughout the north temperate zones of North America, Europe, and Asia. The plant grows from a bulb buried 3 to 10 inches below the ground. The leaves vary from narrow to several inches wide. The plant grows a flower that may be white, blue, or a shade of red. No matter what variety of onion of found, it can be detected by its characteristic "onion" odor. All bulbs are edible (fig. B–12).

(2) *Wild tulip.* The wild tulip is found in Asia Minor and Central Asia. The bulb of the plant can

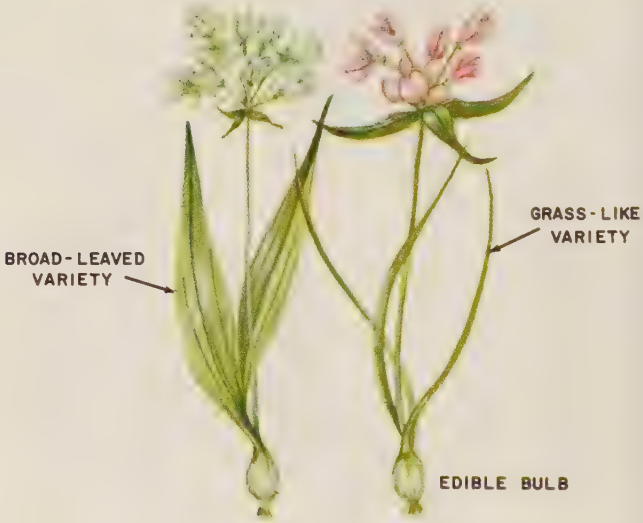


Figure B–12. Wild onion.

be cooked and eaten as a substitute for potatoes. The plant bears flowers for a short time in the spring and these resemble the common garden tulip except they are smaller. When red, yellow, or orange flowers are absent, a seed pod can be found as an identifying characteristic (fig. B–13).

B–2. Shoots and Stems

Edible shoots grow very similarly to asparagus. The young shoots of ferns and bamboo, for example, make excellent food. Although some can be eaten uncooked, most shoots are better if they are par-

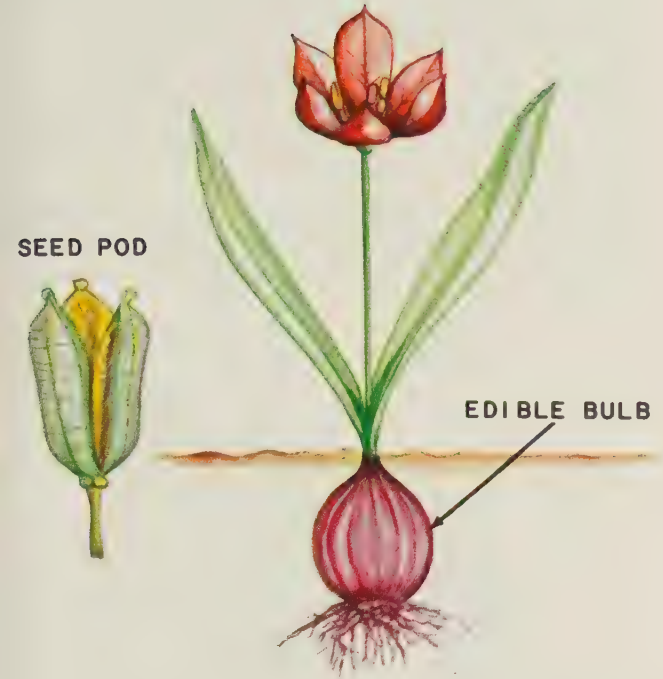


Figure B–13. Wild tulip.

boiled for 10 minutes, the water drained off, and reboiled until they are sufficiently tender for eating. Following are a few of the plants that may be found with edible shoots and stems:

a. Mescal. This plant exists in Europe, Africa, Asia, Mexico, and the West Indies. It is a typical

desert plant, but also grows in moist tropical areas. The mescal, when fully grown, has thick, tough leaves with stout, sharp tips borne in a rosette. In the center is a stalk that rises like a candle to produce a flowering head. This stalk or shoot is the edible part. Select plants having flowers not fully developed; roast the shoot. It contains fibrous, molasses-colored layers that taste sweet (fig. B–14).

b. Wild Gourd or Luffa Sponge. This plant is a member of the squash family and grows similarly to watermelon, cantaloupe, and cucumber. It is widely

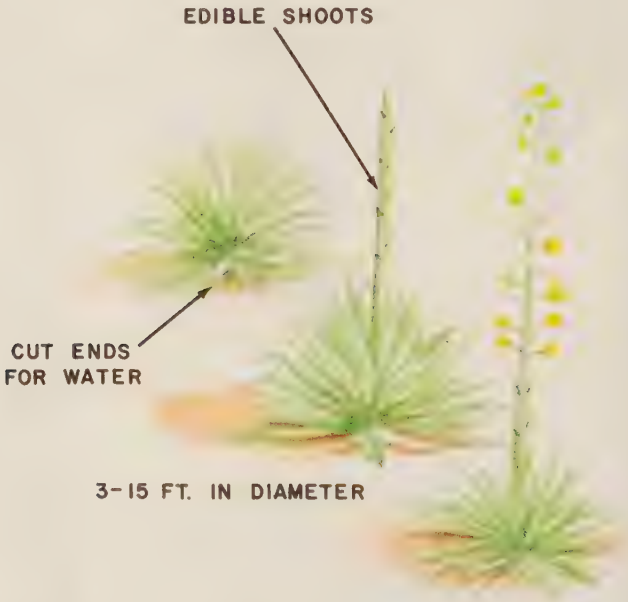


Figure B–14. Mescal.

cultivated in tropical areas, and it might be found in a wild state in old gardens or clearings. The vine has leaves 3 to 8 inches across and the fruit is cylindrical, smooth, and seedy. Boil and eat the fruit when it is half ripe; eat the tender shoots, flowers, and young leaves after cooking them. The seeds can be roasted and eaten like peanuts (fig. B–15).

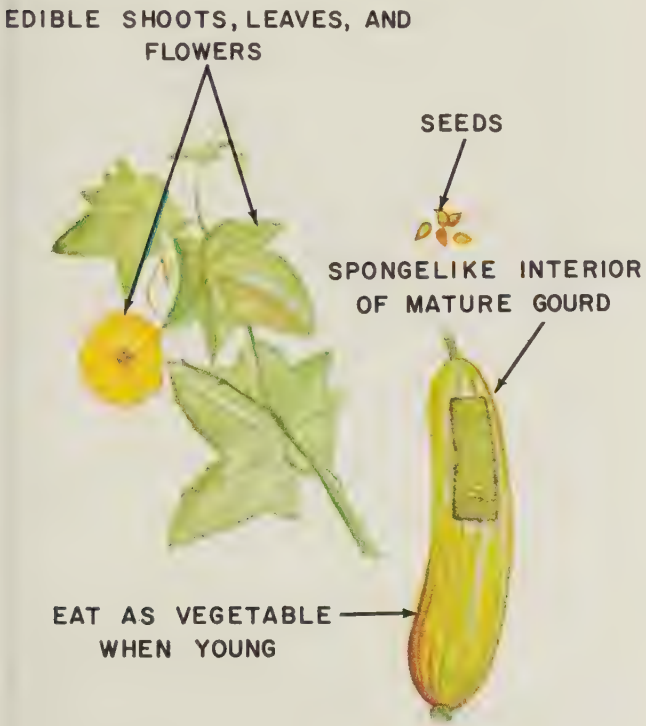


Figure B–15. Wild Gourd.

c. Wild Desert Gourd. Also a member of the squash family, this creeping plant grows abundantly in the Sahara Desert, Arabia, and on the southeastern coast of India. It produces a vine 8 to 10 feet long that runs over the ground and a gourd that grows to about the size of an orange. The seeds are edible roasted or boiled. The flowers also can be eaten, and the water-filled stem shoots may be chewed (fig. B–16).

d. Bamboo. This plant grows in the moist areas of warm temperate and tropical zones. It is found in clearings, around abandoned gardens, in the forest, and along rivers and streams. Bamboo resembles corn and sugar cane plants and can be easily remembered for its popularity for making fishing poles. The mature stems are very hard and woody, whereas the young shoots are tender and succulent, Cut these young shoots as you would asparagus, and eat the soft tip ends after boiling. Freshly cut shoots are bitter, but a second change of water eliminates the bitterness. Remove the tough protective sheath around the shoot before eating. Also edible is the seed grain of the flowering bamboo. Pulverize this, add water, and press it into cakes or boil it like rice (fig. B–17).

e. Edible Ferns. Ferns are abundant in moist areas of all climates, especially in forested areas, gullies, along streams, and on the edge of woods. They may be mistaken for flowering plants, but by careful observation, you should be able to distinguish them from all other green plants. The under surface of the leaves is usually covered with masses of brown dots which are covered with yellow, brown, or black

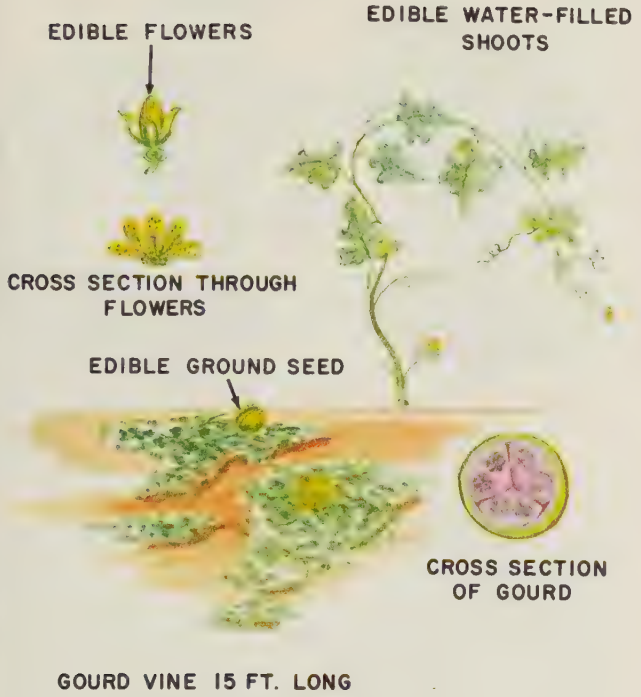


Figure B–16. Desert gourd.

dust. These dots are filled with spores and their presence makes them easily distinguishable from plants with flowers.

(1) Bracken is one of the most widely distributed ferns. It grows through the world, except the

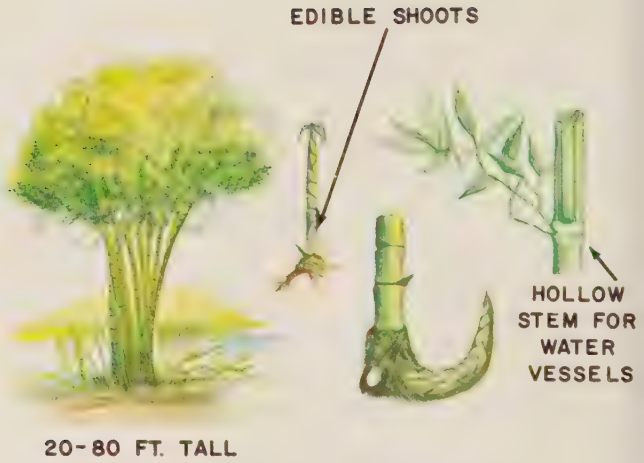


Figure B–17. Bamboo.

Arctic, in open, dry woods, recently burned clearings, and pastures. It is a coarse fern with solitary or scattered young stalks, often one-half inch thick at the base, nearly cylindrical, and covered with rusty felt; the uncoiling frond is distinctly three-forked with a purplish spot at each angle. This spot secretes a sweet juice. Old fronds are conspicuously three-forked, and the rootstalk is about one-quarter inch thick, creeping, branching, and woody (fig. B–18).

(2) On all ferns, select young stalks (fiddleheads) not more than 6 to 8 inches high. Break them off as low as they remain tender; then close your hand over the stalk and draw it through to remove the wool. Wash and boil in salted water or steam until tender (fig. B–19).

Figure B–18. Bracken.

B–3. Leaves

Plants which produce edible leaves are probably the most numerous of all plant foods. They can be eaten raw or cooked; however, overcooking destroys many of the valuable vitamins. Following are some plants with edible leaves:

a. Baobab. This tree is found in open bush country throughout tropical Africa. It can be spotted by its

Figure B–19. Edible fern parts.

enormous girth and swollen trunk, and the relatively low stature of the tree. A mature tree 60 feet high may have a trunk 30 feet in diameter. It produces large white flowers about three inches across that hang loosely from the tree. The tree also bears a mealy pulpy fruit with numerous seeds. These are edible and the leaves can be used as a soup vegetable (fig. 3–19 and para 3–18*c*).

b. Ti Plant. See paragraph B–1*b*(2).

c. Water Lettuce. This plant grows throughout the Old World tropics in both Africa and Asia and in the New World tropics from Florida to South America. It is found only in very wet places, usually as a floating water plant. Look for it in still lakes, ponds, and backwaters, and for the little plantlets growing from the margins of the leaves. These are rosette-shaped, and they often cover large areas in the regions in which they are found. The plant's leaves look much like lettuce and are very tender. Boil the leaves before eating (fig. B–20).

d. Spreading Wood Fern. This plant, especially abundant in Alaska and Siberia, is found in the mountains and woodlands. It sprouts from stout underground stems which are covered with old leafstalks that resemble a bunch of small bananas. Roast these leafstalks and remove the shiny brown covering. Eat the inner portion of the fern. In the early spring, collect the young fronds or fiddleheads, boil or steam them, and eat them like asparagus (fig. B–21).

e. Horseradish Tree. This tropical plant is native to India but is widespread in other tropical countries throughout southern Asia, Africa, and America.

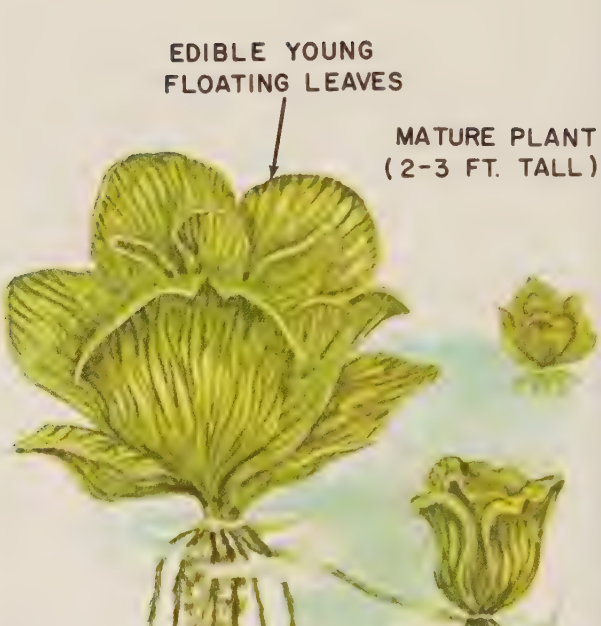


Figure B–20. Water lettuce.

Look in abandoned fields and gardens and on the edges of forests for a rather low tree from 15 to 45 feet high. The leaves have a fern-like appearance and can be eaten old or young, fresh or cooked, de-

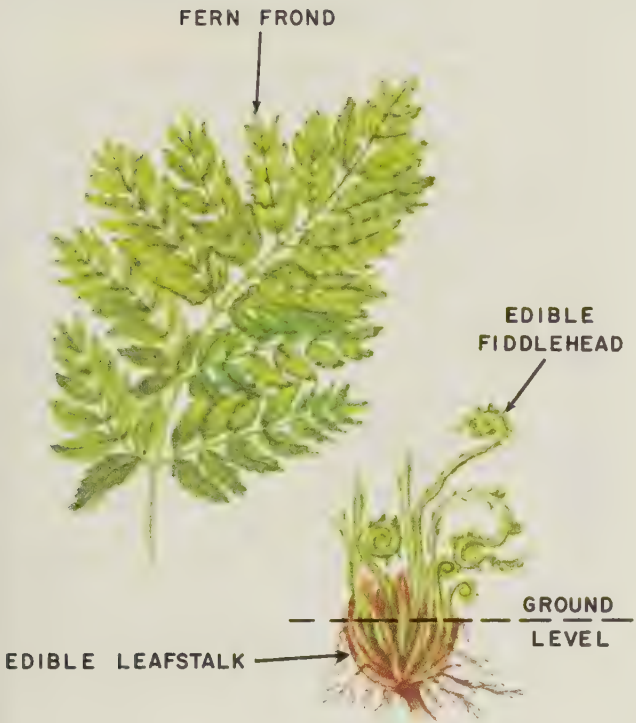


Figure B–21. Spreading wood fern.

pending on their state of hardness. At the ends of the branches are flowers and long pendulous fruit that resemble a giant bean. Cut the long, young seed pod into short lengths and cook them like string beans. Young seed pods can be chewed when they are

fresh. The roots of this plant are pungent and can be ground for seasoning much as you do true horseradish (fig. B–22).

f. Wild Dock and Wild Sorrel. Although these plants are native to the Middle East, they are often abundant in both temperate and tropical countries and in areas having high and low rate of rainfall. Look for them in fields, along roadsides, and in waste places. Wild dock is a stout plant with most of its leaves at the base of its 6 to 12-inch stem. It produces a very small, green to purplish, plume-like cluster of flowers. Wild sorrel is smaller than dock, but similar in appearance. Many of its basal leaves are arrow-shaped and contain a sour juice. The leaves of both plants are tender and can be eaten fresh or slightly cooked. To eliminate the strong taste, change the water once or twice while cooking (fig. B–23).

g. Wild Chicory. Originally a native of Europe and Asia, chicory is now generally distributed throughout the United States and the world as a weed along roadsides and in fields. Its leaves are clustered at ground level at the top of a strong, underground, carrot-like root.The leaves look much like dandelion leaves, but are thicker and rougher. The stems rise 2 to 4 feet and are covered in summer with numerous bright blue heads of flowers, also resembling a dandelion, except for color. The tender young leaves can be eaten as a salad without cooking. Grind the roots as a coffee substitute (fig. B–24).

h. Arctic Willow. This shrub never exceeds 1 or 2 feet in height and is common on all tundra areas in

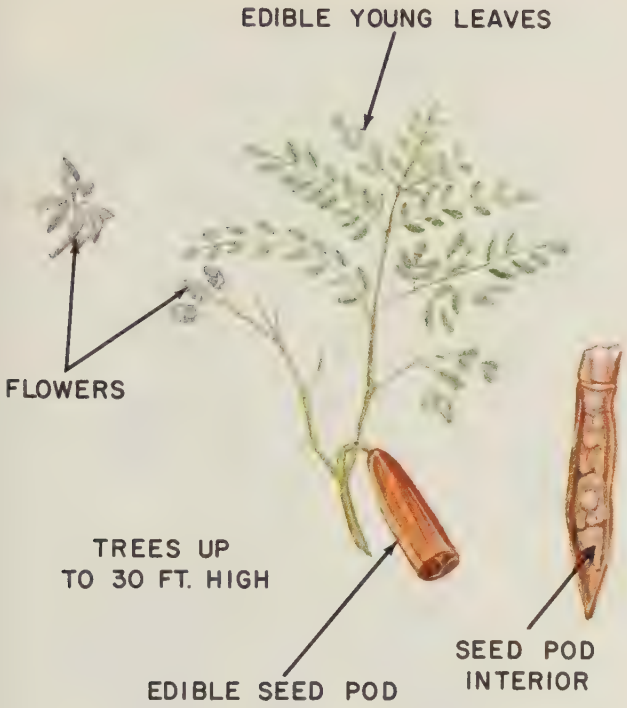


Figure B–22. Horseradish tree.

Figure B–23. Wild dock and wild sorrel.

North America, Europe, and Asia. It grows in clumps which form dense mats on the tundra. Collect young shoots in the early spring and eat the inner portion raw after stripping off the outer bark. The young leaves are a rich source of vitamin C,

COMMON ALONG ROADSIDES

Figure B–24. Wild chicory.

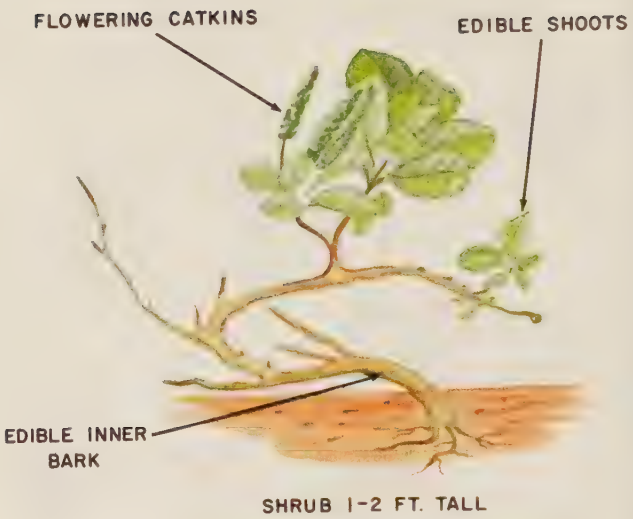


Figure B–25. Arctic willow.

containing 7 to 10 times more than oranges (fig. B–25).

i. Lotus Lily. This plant grows in fresh water lakes, ponds, and slow streams from the Nile basin through Asia to China and Japan, and southward to India. It also grows in the Philippines, Indonesia, northern Australia, and eastern United States. The leaves of the lotus lily are shield-shaped, 1 to 3 feet across. They stand 5 to 6 feet above the surface of the water and grow either pink, white, or yellow flowers 4 to 6 inches in diameter. Eat the young

stems and leaves after cooking, but remove the rough, outer layer of the young stems before cooking or eating. The seeds are also edible when ripe. Remove the bitter embryo from the seeds, then boil or roast them. Also edible are the rootstalks, which become 50 feet long with tuberous enlargements. Boil these and eat them like potatoes (fig. B–26).

j. Papaya. This tree grows in all tropical countries, esspecially in moist areas. It is found around clearings and former habitations, and also in open sunny places in uninhabited jungle areas. The papaya tree is 6 to 20 feet tall with a soft hollow trunk that will break under your weight if you try to climb it. This trunk is rough and the leaves are crowded at the top. The yellow or greenish fruit grows among and below the leaves directly from the trunk and is squash-shaped. It is high in vitamin C and can be eaten cooked or raw. The milky sap of the unripe fruit is a good meat tenderizer if rubbed into the meat. Avoid getting this juice into the eyes —it will cause intense pain and temporary or even permanent blindness. The young papaya leaves, flowers, and stems are also edible. Cook them carefully and change the water at least twice (fig. B–27).

k. Wild Rhubarb. This plant grows from southeastern Europe to Asia Minor through the mountainous regions of Central Asia to China, and can be found in open places, along the borders of woods and streams, and on mountain slopes. The large leaves grow from the base of long stout stalks. These stalks flower and rise above the large leaves, and may be boiled and eaten as a vegetable (fig. B–28).

l. Prickly Pear. This plant is native to America,

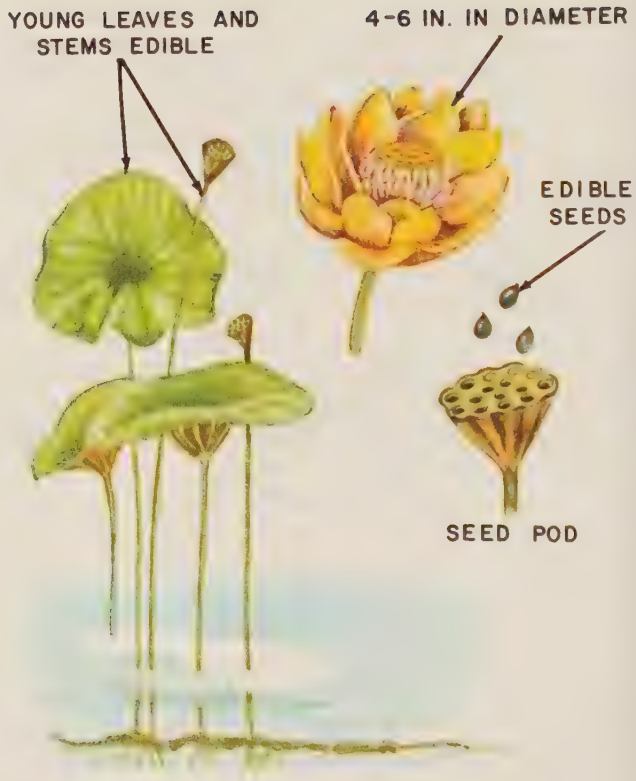


Figure B–26. Lotus lily.

but grows in many desert and seacoast areas of the world except in the Arctic. It is found in the southwestern United States, Mexico, South America, and along the shores of the Mediterranean. It has a thickened stem about an inch in diameter which is

Figure B–27. Papaya.

full of water. The outside is covered with clusters of very sharp spines spaced at intervals, and the plant grows yellow or red flowers. This plant can be mistaken for other kinds of thick, fleshy cactus-like plants, especially those in Africa. The spurges of Africa look like cacti, but contain a milky poisonous juice. The prickly pear never produces a milky juice. The egg-shaped fruit growing at the top of the cactus is edible. Slice off the top of the fruit, peel back the outer layer, and eat the entire contents. Also

Figure B–28. Wild rhubarb.

edible are the prickly pear pads. Cut away the spines and slice the pad lengthwise into strips like string beans. Eat them raw or boiled (fig. B–29).

B–4. Nuts

Nuts are among the most nutritious of all plant foods and contain valuable protein. Plants bearing edible nuts grow in all climatic zones and continents of the world except the Arctic. Some nuts of the

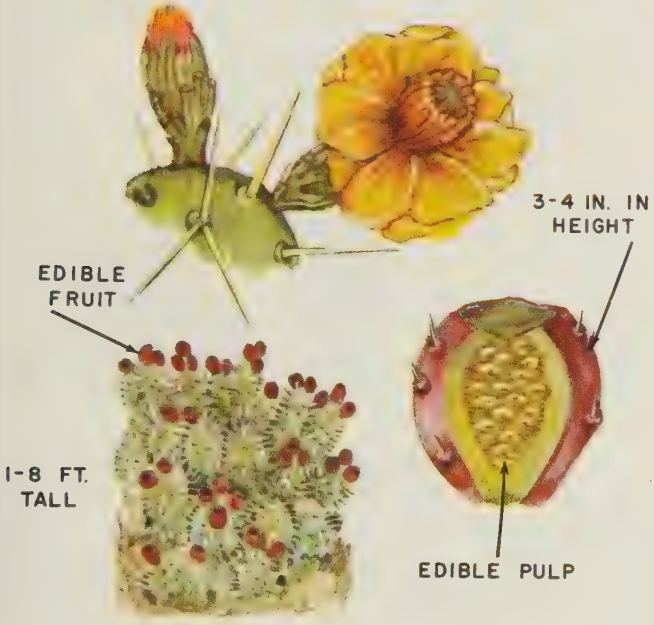


Figure B–29. Prickly pear.

temperate zones are walnuts, filberts or hazelnuts, almonds, hickory nuts, acorns, beechnuts, and pine nuts. Tropical zone nuts include coconuts, Brazil nuts, cashew nuts, and macademia nuts. Following are some edible nuts:

a. English Walnut. In the wild state, this nut is found from southeastern Europe cross Asia to China. It is abundant in the Himalayas and grows on a tree that sometimes reaches 60 feet tall. The leaves of the tree are divided, which is a characteristic of all walnut species. The walnut itself is enclosed by a thick outer husk which must be removed to reach the hard inner shell of the nut. The nut kernel ripens in autumn (fig. B–30).

b. Hazelnut (Filbert). Hazelnuts are found over wide areas of the United States, especially in the eastern half of the country. They also grow in Europe and eastern Asia from the Himalayas to China and Japan. Growing mostly on bushes 6 to 12 feet tall, hazelnuts exist in dense thickets along stream banks and open places. The nut is enveloped by a bristly long-necked husk; it ripens in the fall. It can be eaten either in the dried or fresh unripe stage, and great food value can be derived from its oil content (fig. B–31).

c. Chestnut. Wild chestnuts are highly useful as a survival food. They grow in central and southern Europe, from central Asia to China and Japan. The European chestnut is the most common variety; it grows along the edge of meadows and is a forest tree some 60 feet in height. The ripe or unripe nut can be prepared either by roasting it in embers or by boiling the kernel that lies within the shell. If the

Figure B–30. Walnut.

nut is boiled, mash it like potatoes before eating it (fig. B–32).

d. Almond. Wild almonds grows in the semi-desert areas of southern Europe, the eastern Mediterranean area, Iran, Arabia, China, Madeira, the Azores and the Canary Islands. The almond tree resembles a peach tree and sometimes grows 40 feet tall. The fruit, found in clusters all over the tree, looks somewhat like a gnarled, unripened peach with its stone (the almond) covered with a thick, dry wooly skin. To extract the almond nut, split the fruit down the side, and crush open the hard stone. Gather and shell them in large quantities as a food reserve (fig. B–33).

e. Acorns (*English Oak*). There are many varieties of oak, but the English oak is typical of those found in the north temperate zone. It often grows 60 feet tall and the leaves are deeply lobed. The acorns grow out of a cut and are not edible raw because of the bitter tannin properties of the kernel. Boil the acorns for two hours, pour out the water, and soak the nut in cold water. Change the water occasionally, and after 3 to 4 days, grind the acorns into paste. Make the paste into mush by mixing it with water and cooking it. You can make flour out of this paste by spreading and drying it (fig. B–34).

f. Beechnut. Beechnut trees grow wild in moist areas of the eastern United States, Europe, Asia, and North Africa. They are common throughout southeastern Europe and across temperate Asia but do not grow in tropical or subarctic areas. The beechnut is a large tree, sometimes reaching 80 feet in height, with smooth, light-gray bark and dark green foliage.

Figure B–31. Hazelnut.

Figure B–32. Chestnut.

Figure B–33. Almonds.

Figure B–34. Acorns (English Oak).

Figure B–35. Beechnut tree.

Figure B–36. Pine nuts.

Mature beechnuts fall out of their husk-like seed pods, and the nut can be broken with your fingernail. Roast and pulverize the kernel; then boil the powder for a satisfactory coffee substitute (fig. B–35).

g. Swiss Stone Pine. Swiss stone pine is distributed widely in Europe and northern Siberia. The needles are typically in bunches, and the edible seeds or nuts (fig. B–36) grow in woody cones which hang either separately or in clusters near the tips of the branches. The nuts grow at the base of the cone scales and, when mature, will fall out of the ripe cone. Eat these raw or roasted.

h. Water Chestnut. See paragraph B–1*a*(3).

i. Tropical Almond. The Indian or tropical almond tree is widely dispersed in all tropical countries and is found in abandoned fields, gardens, along roadsides, and upon sandy seacoasts. The edible seeds or kernels growing at the tips of the branches are surrounded by a spongy, husklike covering from 1 to 3 inches long. These kernels have an almond-like flavor and consistency (fig. B–37).

j. Coconut.

(1) The coconut palm is widely cultivated but grows wild throughout much of the moist tropics. It exists mainly near the seashore, but it sometimes grows some distance inland. This tall, unbranched tree sometimes reaches 90 feet. The nuts grow in large clusters and hang downward among the leaves.

(2) The two most valuable parts of the coconut palm are the cabbage and the nut. The cabbage is the snow-white heart at the top of the tree. Eat it cooked, raw, or mixed with vegetables. The nut is

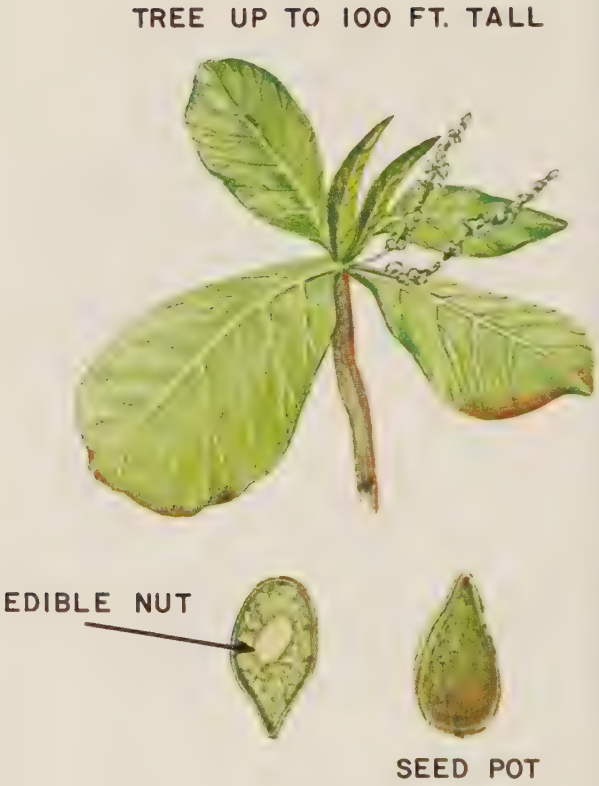


Figure B–37. Tropical almond.

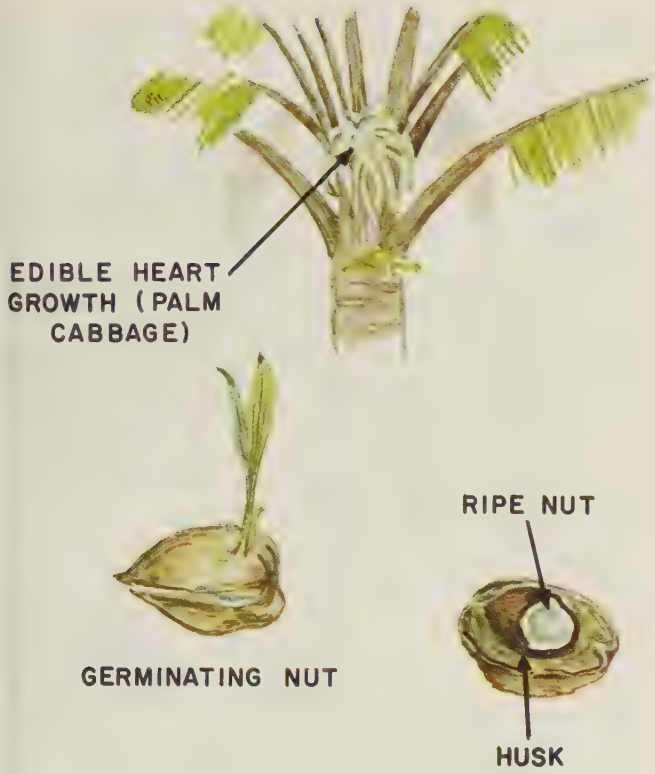


Figure B–38. Germinating coconut.

most useful in the drinking and mature stage. In the drinking stage, split the nut and scoop out the the meat with a spoon fashioned from the outside husk. In the mature stage, crack the nut, loosen the meat, and eat it fresh, grated, or dried to copra. Let the milk stand for a short time so that the oil will separate from it, making it useful for food and drink.

(3) Sprouting coconuts can also be eaten. Husk and split them open or simply crack them in half. Eat the white spongy material inside. To remove the purgative or physic qualities of this meat, cook it before eating (fig. B–38).

k. Wild Pistachio Nut. About seven types of wild pistachio nuts grow in desert or semi-desert areas surrounding the Mediterranean, in Asia Minor, and in Afghanistan. Some plants are evergreen while others lose their leaves during the dry season. The leaves alternate on the stem and have either three large leaves or a number of leaflets. The nuts are hard and dry when mature. Eat them after parching over coals (fig. B–39).

l. Cashew Nut. This nut grows in all tropcial climates, on a spreading evergreen tree that reaches a height of 40 feet. The leaves are normally 8 inches long and 4 inches wide; the flowers are yellowish-pink. The fruit is thick, pear-shaped, pulpy, and red or yellow when ripe, with a kidney-shaped nut growing at the tip. This nut encloses one seed and is edible roasted. The green hull surrounding the nut contains an irritant poison that will blister your eyes and tongue like poison ivy. This poison is destroyed when the nuts are roasted. Caution, however, must be

Figure B–39. Pistachio nut.

Figure B–40. Cashew nut.

Figure B–41. Sea orach.

taken when roasting or boiling the cashew nut because the steam or smoke can cause temporary or permanent blindness (fig. B–40).

B–5. Seeds and Grains

The seeds of many plants such as buckwheat, ragweed, amaranth, goosefoot, and the beans and peas from beanlike plants contain oils rich in protein. The grains of all cereals and many other grasses are also rich in plant protein. They may be ground between stones, mixed with water and cooked to make porridge, or parched. Grains like corn can also be preserved for future use when parched. Following are some plants with edible seeds and grains:

a. Baobab. See paragraph B–3*a*.

b. Sorrel. See paragraph B–3*f*.

c. Sea Orach. This plant is found along seashores from the Mediterranean countries to inland areas in North Africa and eastward to Asia Minor and central Siberia. It is thinly branched with small, edible, gray-colored leaves about an inch long. The flowers grow in narrow, densely compacted spikes at the tips of the branches (fig. B–41).

d. St. John's Bread. This tree grows in arid wastelands bordering the Mediterranean Sea on the fringes of the Sahara, across Arabia, Iran, and into India. It is evergreen and reaches a height of 40 to 50 feet. The leaves are leathery and glistening, with 2 to 3 pairs of leaflets, and its flowers are small and red. A seed pod grows on the tree that has a sweet edible pulp. Pulverize the seeds that are within the pod and cook them as porridge (fig. B–42).

e. Luffa. See paragraph B–2*b*.

f. Rice. Rice normally grows in wet areas as a cultivated plant. It is found in tropical, warm, and temperate countries throughout the world; however, wild rice exists in Asia. Africa, and parts of the United States. It is a coarse grass growing to a height of 3 to 4 feet with rough hard leaf blades ½ to 2 inches wide. The rice grains grow inside a hairy, straw-colored covering out of which the mature grains shatter when ripe. Roast these rice grains, and beat them into a fine flour. Combine the flour with palm oil to make cakes. Wrap these in large green leaves and carry them for future use. Rice may also be prepared by boiling (fig. B–43).

g. Lotus Lily. See paragraph B–3*i*.

h. Goa Bean.

(1) This plant grows in tropical Africa, Asia, the East Indies, the Philippines, and Formosa. The bean is edible, common in the tropics, and found in clearings and around abandoned gardens (fig. B–44).

(2) The goa bean is a climbing plant covering trees and shrubs and has a bean 9 inches long, leaves 6 inches long, and produces bright blue flowers. The mature pods are four-angled with jagged wings.

(3) Eat the young pods like string beans; prepare the mature seeds by parching or roasting them over hot coals. Eat the roots raw and the young leaves raw or steamed.

i. Bamboo. See paragraph B–2*d*.

B–6. Fruit

a. Edible fruit is plentiful in nature and can be classified as a dessert or vegetable. Dessert fruit includes the familiar blueberry and crowberry of the

Figure B–42. St. John's bread.

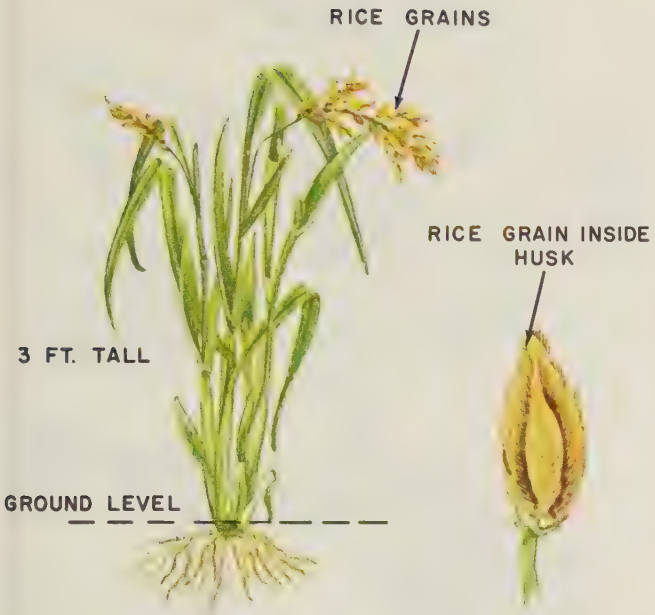


Figure B–43. Wild rice.

North, and the cherry, raspberry, plum, and apple of the temperate zone. Vegetable fruit is the common tomato, cucumber, pepper, eggplant, and okra.

b. Some wild fruit and berries of the United States, but common also in other areas, are—

(1) *Rose-apple.* This tree is native to the Indo-Malayan region but has been planted widely in most other tropical countries. This tree (10 to 30 feet high) also appears in a semi-wild state in thickets,

Figure B–44. Goa bean.

Figure B–45. Rose-apple.

waste places, and secondary forests. It has tapering leaves about 8 inches long and greenish-white flowers up to 3 inches across. The fruit is 2 inches in diameter, greenish or yellow, and has a rose-like odor. It is excellent fresh or cooked with honey or palm sap (fig. B–45).

(2) *Wild huckleberries, blueberries, and whortleberries.* Large patches of wild huckleberries thrive on the tundra in Europe, Asia, and America in late summer. Farther south throughout the northern hemisphere these berries and their close relatives, the blueberry and whortleberry, are common. When they appear in the tundra of the north, these wild berries grow on low bushes. Their relatives to the south are borne on taller shrubs which may reach six feet in height. They are red, blue, or black when ripe (fig. B–46).

(3) *Mulberry.* Mulberry trees grow in North and South America, Europe, Asia, and Africa. In the wild state they are found in forested areas, along roadsides, and in abandoned fields, and often grow 20 to 60 feet tall. The fruit looks like the blackberry and is 1 to 2 inches long. Each berry is about as thick as your finger and varies in color from red to black (fig. B–47).

(4) *Wild grapevine.* This parasite plant is found throughout eastern and southwestern United States, Mexico, Mediterranean areas, Asia, East Indies, Australia, and Africa. Its leaves are deeply lobed and are similar to those of cultivated grapes. The fruit hangs in bunches and is rich in natural, energy-giving sugar. Water can also be extracted from the grapevine (fig. B–48).

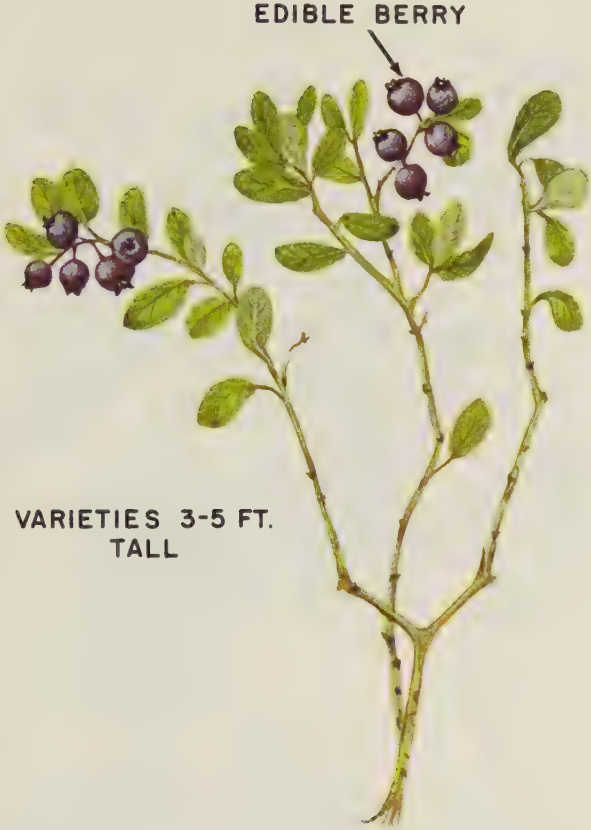


Figure B–46. Wild blueberry.

Figure B–47. Mulberry.

(5) *Wild crab apple.* This fruit is common in the United States, temperate Asia, and in Europe. Look for it in open woodlands, on the edge of woods, or in fields. The apple looks like its tame relative and can be easily recognized wherever it may be found. This fruit can be cut into thin slices and dried for a food reserve (fig. B–49).

(6) *Bael fruit.* This fruit grows on small, citrus-type trees and is related to oranges, lemons, and

Figure B–48. Wild grapevine.

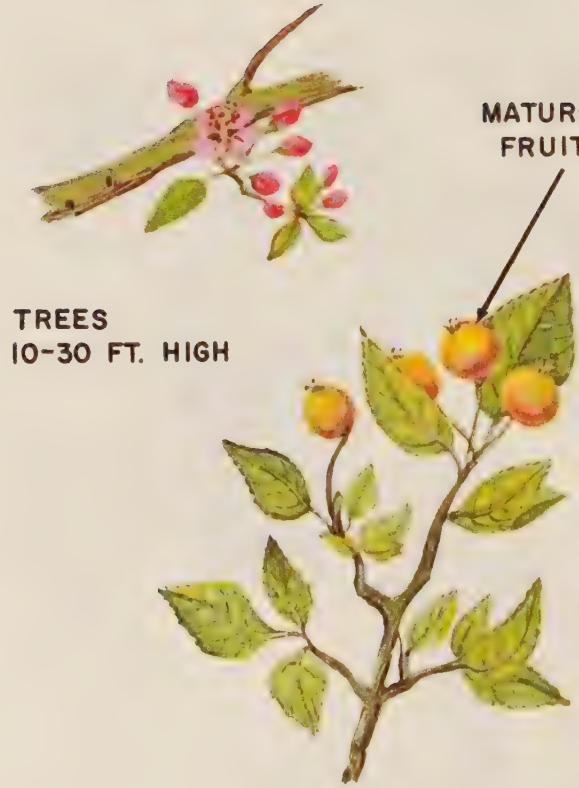


Figure B–49. Wild crab apple.

grapefruit. It is found wild in the region of India bordering the Himalayan mountains, in central and southern India, and in Burma. The tree is 8 to 15 feet tall with a dense and spiny growth, while the

fruit is 2 to 4 inches in diameter, gray or yellowish, and full of seeds. Eat the fruit when it is just turning ripe, or mix the juice with water for a tart but refreshing drink. Like other citrus fruits, this is rich in vitamin C (fig. B–50).

(7) *Wild fig.* Most of the 800 varieties of wild figs grow in tropical and subtropical areas having abundant rainfall; however, a few desert kinds exist in America. The trees are evergreen with large, leathery leaves. Look in abandoned gardens, along

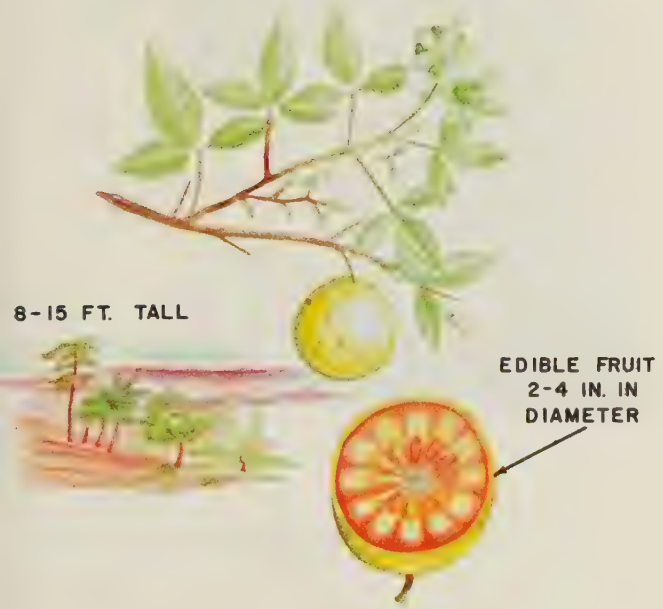


Figure B–50. Bael fruit.

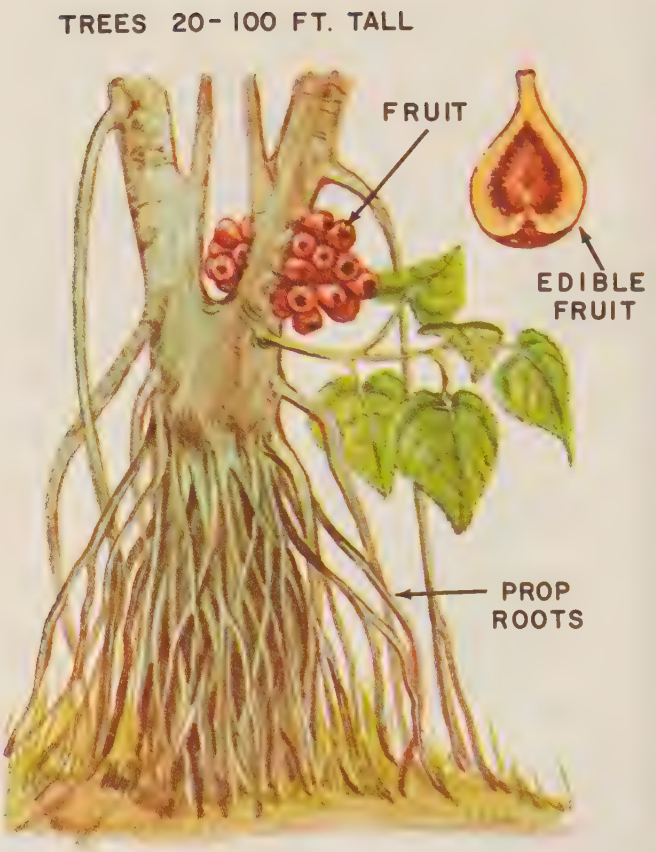


Figure B–51. Wild fig.

TREES UP TO 20 FT. HIGH

Figure B–52. Wild caper.

roadways and trails, and in fields for a tree with long aerial roots growing from its trunk and branches. After identifying the tree, look for the fruit which grows out directly from the branches. The fruit resembles a pear. Many varieties are hard and woody and covered with irritating hairs; these varieties are worthless as a survival food. The edible type is soft when ripe, almost hairless, green, red, or black in color (fig. B–51).

c. Plants With Vegetable-type Fruit.

(1) *Wild caper.* This plant grows either as a spring shrub or small tree about 20 feet tall in North Africa, Arabia, India, and Indonesia. It is leafless with spine-covered branches, flowers, and fruit that grow near the tips of the branches. Eat the fruit as well as the flower buds (fig. B–52).

(2) *Breadfruit.* The breadfruit is a common tropical tree. It grows up to 40 feet tall with leathery leaves 1 to 3 feet long (fig. B–53). The fruit is delicious when ripe, and it can be prepared by using the following methods: Eat the fruit raw, boiled, or grilled on the embers of an open fire. To eat it raw, remove the skin first; then pick off the lumps of flesh to separate the seeds, and discard the hard outer covering. To cook, cut in small pieces and boil for 10 minutes. For grilling, scrape the fruit and remove the stalk.

(3) *Wild gourd.* See paragraph B–2*b*.

(4) *Water plantain.* See paragraph B–1*b*(3).

B–7. Bark

a. The inner bark of a tree—the layer next to wood—may be eaten cooked or raw. You can make

flour from the inner bark of cottonwood, aspen, birch, willow, and pine trees by pulverizing it. Avoid the outer bark because of the presence of large amounts of tannin.

b. Pine bark is rich in vitamin C. Scrape away the outer bark and strip the inner bark from the trunk. Eat it fresh, dried, or cooked, or pulverize it into flour.

B–8. Seaweed

a. Properly prepared seaweed found near or on the shores of the larger ocean areas is a valuable source of iodine and vitamin C.

b. Select seaweed attached to rocks, or floating free, because those that have lain on the beach for any length of time may be spoiled or decayed. You can dry the thin, tender varieties over a fire or in the sun until they are crisp; then crush and use them for soup flavoring. Wash the thick leathery seaweed and soften it by boiling. Eat these varieties with other food.

c. Following is some edible seaweed that may be found:

(1) Green seaweed, often called sea lettuce, grows in the Pacific and North Atlantic Oceans. Wash in clean water and use it as you would garden lettuce (fig. B–54).

(2) Edible brown seaweed include—

(*a*) *Sugar wrack.* The young stalks of this plant are sweet. The plant is found on both sides of the Atlantic and on the coasts of China and Japan (fig. B–55).

Figure B–53. Breadfruit.

Figure B–54. Sea lettuce.

(*b*) *Kelp.* This seaweed is found in both the Atlantic and Pacific Oceans below the high tide line on submerged ledges and rocky bottoms. It has a short cylindrical stem and thin, wavy, olive-green or brown fronds from one to several feet long. Boil it before eating; then mix with vegetables or soup (fig. B–56).

(*c*) *Irish moss.* This moss is found on both sides of the Atlantic. It is tough, elastic, and leathery

Figure B–55. Sugar wrack.

and may be found below the high tide line or on the shore. Boil it before eating (fig. B–57).

(3) Red seaweed has a characteristic reddish tint and includes—

Figure B–56. Kelp.

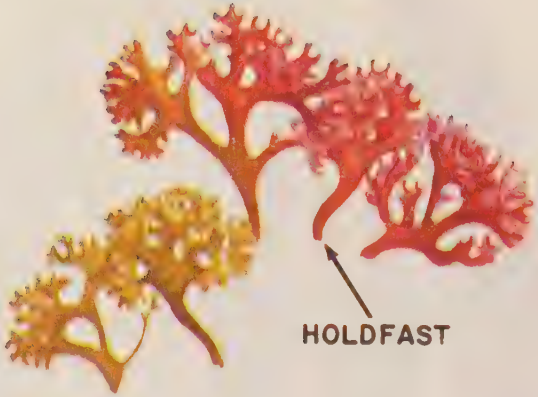


Figure B–57. Irish moss.

(*a*) *Dulse.* This type has a short stem which quickly broadens into a thin, broad, fan-shaped leaf. The leaf is dark red and divided by several clefts into short, round-tipped lobes. Varying from a few inches to a foot in length, this plant is attached to rocks or coarser seaweeds and is found on the Atlantic and Mediterranean coasts. It is sweet and can be dried and rolled and used as chewing tobacco (fig. B–58).

(*b*) *Laver.* This seaweed is common to the Atlantic and Pacific areas and is usually red, dark

Figure B–58. Dulse.

PAPER-THIN PLANT BODY

Figure B–59. Laver.

purple, or purplish-brown with a satiny sheen or filmy luster. Use it as a relish, boil it gently until tender, or pulverize it; add it to crushed grains and fry it in the form of flatcakes. Look for this plant on the beach at low tide (fig. B–59).

(4) Fresh-water algae are a variety of seaweed common to China, America, and Europe. One of the more familiar varieties is nostoc which is found during the spring in pools. It forms green, round, jelly-like lobules about the size of marbles. Dry this plant and use it in soup (fig. B–60).

Figure B–60. Fresh-water Algae.

APPENDIX C

POISONOUS SNAKES

C–1. General

a. The common fear of snakes among most people is due to unfamiliarity and misinformation. Even the harmless types are sometimes regarded with apprehension. There is no need, however, to fear snakes once you know something about them, their habits, how to identify the dangerous kinds, the simple precautions to take to prevent snakebite, and the first aid measures to use in the very rare emergency of being bitten.

b. The chances of being bitten by a poisonous snake are very small. The danger of death from snakebite is considerably less than the possibility of being killed in a jeep wreck or getting shot accidentally.

c. Dismiss as exaggerations most of the popular literature you have read and the stories you have heard about snakes. Do not believe all the rumors about the number, size, and ferocity of the local snakes in a given area. Natives know all the poisonous kinds, but in addition, you may be told that many harmless species are deadly. Statistics on the number of people bitten by poisonous snakes are unreliable. This is especially true in the wilder areas

where dangerous snakes are numerous. Furthermore, the fatalities are almost always among people who walk barefooted and therefore are bitten on the feet or ankles. If you wear shoes and trousers while living in a camp, the danger of being biten by a poisonous snake is small, compared to the hazards of malaria, cholera, dysentery, or other diseases. mosquitoes are actually more dangerous than snakes.

d. In camps and barracks where snakes are relatively plentiful, one may seldom be seen. Men working or fighting in the jungle may see them occasionally. Many may be seen by those engaged in clearing ground, cutting grass or jungle, or digging soil.

e. There are many reasons why snakes are a minor hazard. First of all, most snakes are harmless, depending to a great extent on the maturity of the snake. Usually, only a grown one is really dangerous to man. The bite of an immature snake is less likely to be fatal.

f. There are small snakes, however, that are a maximum of about 5 feet and are very poisonous from the time of birth. A few are listed below:

Snake	*Average size (ft.)*	*Location*
Asiatic cobra	5	India
Asp-Egyptian cobra	3½	Egypt and South Africa
Tic pologna	4	India
Puff adder (African variety).	3½	Morocco and Arabia
Mamba	5	West, Central South Africa
Tiger Snake	4	Australia
Sand viper	2	North Africa
Gaboon viper	3–4	Tropical Africa
Urutu	4	Brazil
Coral	1–2	United States, Southwestern Pacific

g. Nearly all snakes avoid man if possible. It is reported that the king cobra of southeastern Asia, the bushmaster or the tropical rattlesnake of South America, and the mamba of Africa sometimes aggressively attack man, but even these snakes do so only occasionally. Most snakes move out of the way and seldom are seen.

h. The distance at which a snake may bite has often been exaggerated. This striking distance seldom is more than half the snake's length; of the large snakes, about a third of the length; and of some snakes, even less. Some of the small vipers, however, have been known to strike from a distance equal to their full length. In a full coil, some snakes have been known to strike from a distance equal to two-thirds their length. The distance a cobra can strike is easy to judge since the part raised is never bent into deceptive S-curves but merely is jabbed forward and downward; commonly the distance is about 1 foot; the striking distance of a 12-foot king cobra may be as much as 3 feet. A normally alert person should be able to see a snake before coming within striking range. Most bites occur when a snake is stepped on accidentally.

i. All these facts do not mean that there is no possibility of being bitten or that poisonous snakes are harmless creatures which will make fine pets. *It is stupid and highly dangerous for even an experienced person to pick up a snake unless he is positive the snake is harmless.*

j. It is needless to fear snakes if these facts are known. The possibility of being bitten can be minimized by keeping your eyes open, by keeping your hands off *all* snakes, by learning how to identify the

dangerous kinds in your own local area, by following the simple precautions for avoiding snakes, and by knowing what to do in the very rare event of being bitten.

C–2. Identification of Kinds of Poisonous Snakes

a. Poisonous snakes are difficult to identify. There is *no single* characteristic which distinguishes a poisonous snake from a harmless one except the presence of poison fangs and glands. The presence of these parts can be determined without danger only in dead specimens, and even then the fangs may be hard to find.

b. The idea that all poisonous snakes have lance-shaped or triangular heads or some other warning feature is wrong and dangerous. Many dangerous snakes do have lance-shaped heads, but many do not.

c. The only positive way to identify dangerous snakes is to learn to know and recognize the poisonous kinds on sight in the particular area in which you are based. The illustrations on the following pages describe the important kinds found in given areas. In any given locality, it is more likely that only one or two kinds will be seen, and you can learn to identify them further by studying dead specimens. The ability to distinguish a poisonous snake from a harmless one will minimize the danger of snakebite and help eliminate fear.

d. Although they are not poisonous, it is worth knowing some facts about pythons, boas, anacondas, and other constrictors. Some of these are large snakes which may grow 25 feet in length. These reptiles are timid and rarely attack man. Boas are found in the

American tropics; pythons in the tropics of Africa and Asia. They sometimes attack small children but will not deliberately tackle anything that is too large to swallow. A man is too big for even the largest python. If caught or cornered, these snakes may fight back by wrapping their coils around the attacker. If left alone, they are not dangerous.

C–3. Poisonous Snakes of Southeastern Asia

(fig. C–1).

a. Cobras.

(1) *Description.* The typical combat attitude of the raised head and spread hood is the easiest characteristic by which cobras can be identified. The most common species, the Indian cobra, may grow as long as 6 feet. The "spectacle" mark on the hood is typical of this species; the mark may consist of only one spot or of two without the bridge. Cobras usually (but not always) form a hood when angered. The king cobras are the largest of all poisonous snakes; they average 10 to 12 feet long; some may reach 18 feet. For the proportion of the snake, the hood formed by the king cobra is narrower than that of other cobras.

(2) *Habits.* Cobras are the most common poisonous snakes in much of Southeastern Asia; they are particularly numerous in India where natives do not destroy them because of religious beliefs. Cobras are found most frequently in rocky places or in old buildings where they feed on rats. The most common species are not particularly vicious. King cobras, however, may attack deliberately, especially if guarding eggs. Cobras are slow snakes; they

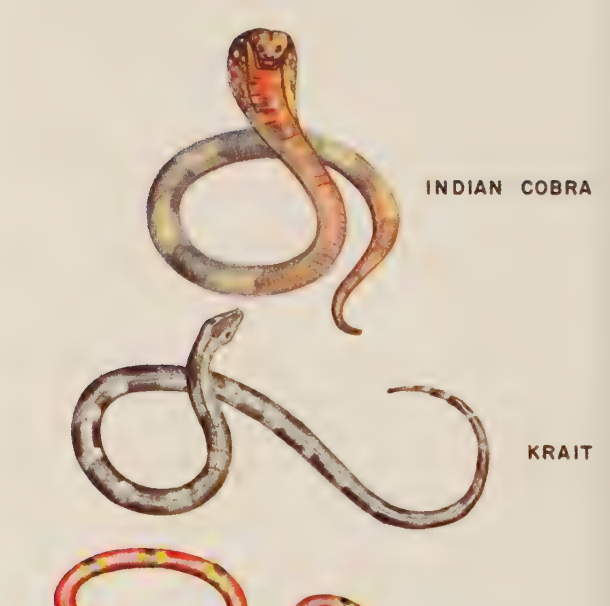


Figure C–1. Snakes of Southeastern Asia.

always raise the head to strike. They can be killed with a stout stick swung in a plane parallel with the ground, aimed at the head or raised part.

b. Kraits.

Figure C–1—Continued.

(1) *Description.* Most kraits are brightly banded in black and white or black and yellow. They have a rigid backbone on which there is a row of enlarged scales. The head is small and not much

larger than the neck. Kraits average 4 to 5 feet long, but may reach 6 feet.

(2) *Habits.* The common krait of India moves around mostly at night. It lives in open country rather than in thick jungle brush, and is often found near inhabited places and on trails at night. The banded krait prefers thick jungle. All kraits are very poisonous. They are inoffensive snakes; and normally will not bite unless stepped on. Unlike the cobra, kraits do not raise the head to strike, nor do they strike in a loop like a viper—they simply flip the head to one side or the other and bite.

c. Coral Snakes.

(1) *Description.* These snakes have bright red or pink bellies and brightly colored bands on the back. There are 3 or 4 kinds of coral snakes generally averaging under 2 feet in length; one species may grow 4 feet long.

(2) *Habits.* Coral snakes are inoffensive; they stay hidden and are not inclined to bite unless disturbed. They bite in the same manner as kraits. Coral snakes seldom are seen and cause very few fatalities.

d. Positive Identification of Cobra Family (cobras, kraits and coral snakes) (fig. C–2).

These snakes can be identified positively by examining the scales of a dead specimen. If the third scale on the upper lip touches *both* the nostril scale and the eye, the snake is a cobra or coral and is poisonous. If there is also a row of enlarged scales down the rigid back, the snake is a krait.

e. Vipers.

(1) *Description.* Vipers usually have heads

POSITIVE IDENTIFICATION OF COBRA FAMILY
(COBRAS, KRAITS AND CORAL SNAKES)

POSITIVE IDENTIFICATION FOR PIT VIPER FAMILY

Figure C–2. Positive identification of cobra and pit viper family.

which are much wider than the neck. The most common and most dangerous species is Russell's viper. It is thick and grows up to 5 feet long. There are conspicuous markings on the back, consisting of three rows of spots formed by black rings bordered with white and with reddish or brown centers. The saw-scaled viper is another dangerous species. These are small snakes, about 2 feet long, generally light in color with dark quadrangles. The

side scales are rough and somewhat saw-toothed. When disturbed, these snakes writhe vigorously and make a hissing noise.

(2) *Habits.* Russell's viper prefers open, sunny spots, but can be found almost anywhere, except in thick jungle. It is not particularly vicious and will not strike unless it is considerably irritated. The saw-scaled viper, though small, is vicious and bites readily; vipers only a foot long have been known to kill. They prefer desert or dry areas and are not found in thick jungle.

f. Pit Vipers.

(1) *Description.* Pit vipers may be slender or thick-bodied. Usually, they have heads which are much wider than the necks. These snakes commonly are brown with dark blotches; some types are green. They are named for the deep pit located between the eye and nostril.

(2) *Habits.* India has about a dozen species of these snakes. The pit vipers are found in all types of terrain and may be found in the trees or on the ground. The tree snakes are slender; the ground snakes are thicker and heavy-bodied. Only the larger ones are dangerous. One of the pit vipers of China is a *moccasin* similar to those found in North America; it is found in the rocky areas of the remote mountains of South China; it attains a length of 4½ feet but is not vicious unless irritated. A small pit viper, about 1½ feet long, is found often on the plains of Eastern China; it is too small to be dangerous to a man wearing shoes.

g. Positive Identification of Vipers. Vipers and pit vipers have two long and distinctive fangs; none

of the other teeth are comparable in size. The fangs may be covered with a curtain of flesh or folded back into the mouth (fig. C–2).

h. Sea Snakes.

(1) *Description.* These snakes have a flattened oar-like tail and are distinguished from eels in that the snakes have scales and eels do not. Sea snakes vary widely in color and shape; they average 4 to 5 feet in length, but sometimes reach a length of 8 to 10 feet.

(2) *Habits.* Sea snakes are found along the coasts and at the mouths of some of the larger rivers. The bite of these snakes is dangerous but rare. Sea snakes sometimes may be seen in large numbers, but they seldom will bite unless they are handled. No cases are known of a deliberate attack of a man in the water.

i. Distribution of Poisonous Snakes of Southeastern Asia. See figure C–3.

C–4. Poisonous Snakes of North America

a. Coral Snakes. See paragraph C–3 and figure C–1.

b. Rattlesnakes.

(1) *Description.* There are about 27 species of rattlesnakes in the United States and Mexico. Except in those localities where they have been exterminated, one or more types are found in every locality. The rattle on the end of the tail is the best and most positive means of identification. If the rattle is hidden, the thick body and the wide head are good danger signs. Some rattlesnakes are small and their bite is not likely to result in death.

Cobras

Found throughout the area as far north as Foochow in China.

Kraits, Coral Snakes and Vipers

Found throughout the area south of a line drawn from Shanghai to Chengtu. Only one viper, Russell's viper, occurs in the East Indies, the Malay Peninsula and Formosa.

Pit Vipers

Found throughout the area. These are the only poisonous snakes in China found north of the Shanghai-Chengtu line.

Sea Snakes

Found along all coasts as far north as Foochow; rare in Chinese coastal waters.

Figure C–3. Distribution of poisonous snakes of Southeastern Asia.

Figure C–4. Snakes of North America.

Others, such as the diamond backs, may grow to lengths of 8 feet, and are very dangerous snakes. In color, rattlesnakes vary from gray to black and may or may not have spots or blotches.

(2) *Habits.* Rattlesnakes may be found in practically any type of terrain, but they prefer open, sandy places or rocky ledges. They do not always give a warning rattle. When surprised, they may strike first and rattle afterward; some cannot be induced to rattle under any circumstances. Most rattlesnakes almost always will try to escape without a fight; however, there is always a possibility that it may strike at a passerby. The danger from a bite depends upon the size of the snake; a small rattlesnake will make a normal man sick; the bite of a large one, 3 to 5 feet long, may be fatal.

c. Water Moccasins (Cottonmouth).

(1) *Description.* The water moccasin has a thick body and a head which is wider than the neck. It averages 3 to 4 feet in length, but may grow as long as 6 feet. It usually is dull brown or olive in color and is marked with indistinct bands or blotches; the markings sometimes disappear in the larger snakes. The belly is yellowish, blotched with darker markings. Young moccasins are brilliantly colored. The mouth, when open, is white. The water moccasin is often confused with various species of harmless water snakes, many of which closely resemble it in color and shape. Unidentified snakes found in or near water should be avoided.

(2) *Habits.* The water moccasin lives in or near water and is a good swimmer. Often it is seen on logs or leaning trees in swamps; it is fond of basking on branches and logs along sluggish streams, bayous, and swamps. The snake usually will retreat when disturbed; but it may stand its ground, holding its mouth wide open in a threaten-

ing gesture. For this reason, it is sometimes called a "cottonmouth," "gapper" or "trapjaw." The venom of the water moccasin is very poisonous, and the bite of a large snake often is fatal.

d. Copperhead (Upland Moccasin).

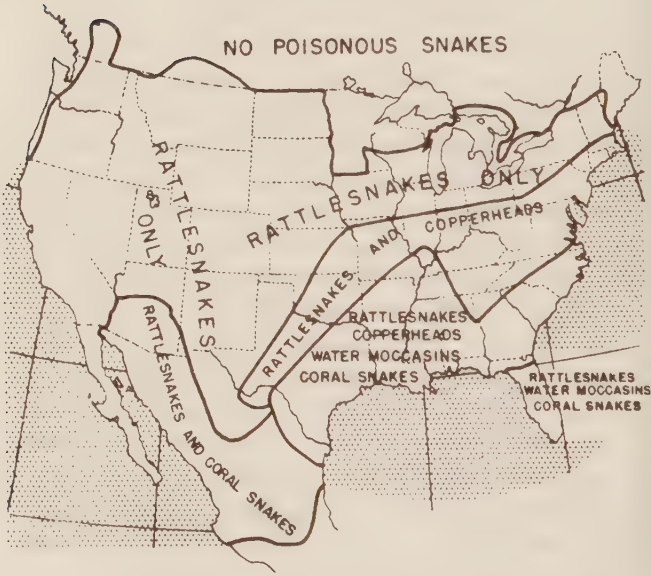
(1) *Description.* This is a thick-bodied snake with a head which is wider than the neck. It reaches an average length of 2½ feet, but some specimens may be as long as 4½ feet. The color usually is pale brown, with a number of darker cross-bands narrowing at the midline of the back. The markings may be few and inconspicuous on the larger snakes. The head usually is copper-red in color. The belly generally is light in color and somewhat mottled.

(2) *Habits.* In the northern areas, the copperhead usually is found in thick forests. In the south, it may be found on dry ground almost anywhere in the fields or woods. It prefers high dry ground. These snakes are rather timid; they usually stay hidden and try to escape when discovered. If cornered, they may vibrate the tail and produce a distinct buzzing sound in vegetation. Even where they are quite numerous, bites from copperheads are rare. The venom is weak and not particularly dangerous to adults. Only a few fatal cases have been recorded. The copperhead also is known as "upland moccasin," "chunk-head," "death adder" or "pilot snake."

e. Distribution of Poisonous Snakes of North America. See figure C–5.

C–5. Poisonous Snakes of Central and South America (fig. C–6).

DISTRIBUTION OF POISONOUS SNAKES OF NORTH AMERICA



The distribution of the copperhead and the moccasin in Mexico is somewhat indefinite. It is believed that they are found along the Rio Grande River. Moccasins have been found rarely along the coasts of Mexico.

Figure C–5. Distribution of poisonous snakes of North America.

a. Coral Snakes. See paragraph C–3 and figure C–1.

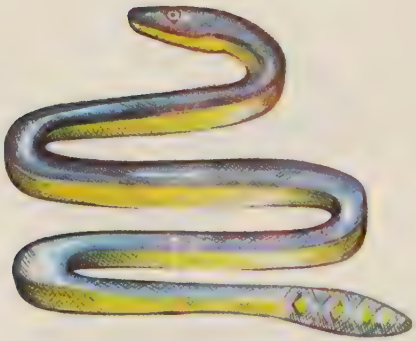
b. Rattlesnakes.

(1) *Description.* Of the five kinds of rattlesnakes in Central and South America, only the

Figure C–6. Snakes of Central and South America.

tropical rattlesnake is widely distributed. This snake and its close relatives are large snakes, averaging about 5 feet long. The characteristic tropical rattlesnake has a pair of dark stripes extending

FER-DE-LANCE GROUP



SEA SNAKE

SNAKES OF CENTRAL AND SOUTH AMERICA

Figure C–6—Continued.

along the neck, with geometrical body markings. The Mexican rattlesnake is similarly marked, but without dark stripes. A smaller rattlesnake, found on Aruba Island, has a pale gray back and a white

belly. The rattle on the tip of the tail is sufficient identification for all the rattlesnakes.

(2) *Habits.* The tropical rattlesnake is a vicious reptile. It is large and aggressive and its venom is highly poisonous. This snake may strike with very little warning rattle and before coiling. If teased it may advance toward the tormentor. It is found only in dry, hilly country, not in thick forests. The tropical rattlesnake is also known as the "cascabel" in Mexico and Central America and as the "cascavel" in Brazil.

c. Bushmasters.

(1) *Description.* This is a large snake with a moderately slender body and a head much wider than the neck. It averages from 7 to 9 feet in length, but may grow longer than 11 feet. It is light brown with a pinkish hue and has a series of dark blotches which are wide on the back and narrow down the sides. The scales are extremely rough and raised like the teeth of a rasp.

(2) *Habits.* The bushmaster is found mostly in forests at low altitudes. It prefers dry ground and often hides in animal burrows. When lying on the forest floor, its camouflage is hard to see. The snake may either remain motionless until touched, or it may attempt to escape when cornered. It may strike viciously; sometimes it may even edge towards an intruder. The tail is vibrated when the snake is irritated, and if it rattles among dry leaves, the snake may be mistaken for a rattlesnake. The bushmaster is a savage and dangerous snake, but is seldom seen. The best precaution is to wear boots and to keep bare hands out of holes and brush close to the ground.

d. Fer-De-Lance Group.

(1) *Description.* There are several closely related species in this group. The fer-de-lance and about six of its relatives are gray to brown or reddish in color, with dark geometrical blotches which generally are narrow on the back and broad at the sides. It is moderately thick with a head which is much wider than the neck. The fer-de-lance averages about 3 to 4 feet long but may grow as long as 8 or 9 feet. Some members of the group are smaller and display almost any color, including green or yellow; some have thick bodies. The fer-de-lance is also known as the "barba amarilla."

(2) *Habits.* This group of snakes is widespread throughout Central and South America. The large species are ground snakes; some of the small ones, known as palm vipers, live in trees, especially at the base of the leaves of a palm tree. The larger snakes are dangerous. They may be common in certain areas and are often found in cane fields or around dwellings where they catch rats. This snake loops its body before striking.

e. Positive Identification of the Pit Viper Family (fig. C–2). The rattlesnake, the bushmaster, and the fer-de-lance group are all related to pit vipers. All have two long fangs in the upper jaw and have no other teeth of comparable size. The two long fangs may be covered with a curtain of flesh or they may be folded back in the mouth. Another charateristic of these snakes is the presence of a deep pit between the eye and the nostril.

f. Sea Snakes.

(1) *Description.* This snake is found only in

salt water along the Pacific Coast from the Gulf of California to Ecuador. It is sometimes very abundant in the Gulf of Panama. It is not found in the Atlantic Ocean. The sea snake of the Americas has a brown to black back and a yellow belly. These snakes may average 2 to 3 feet in length.

(2) *Habits.* This sea snake is found in salt or brackish water near the coast. Occasionally, one may be caught in a fishing net; it should be carefully discarded.

g. Distribution of Poisonous Snakes of Central and South America. See figure C–7.

C–6. Poisonous Snakes of Europe, Africa, and the Near East

(fig. C–8)

a. Coral Snakes. See paragraph C–3 and figure C–1.

b. Sea Snakes. See paragraphs C–3 and C–5 and figures C–1 and C–6.

c. European Vipers.

(1) *Description.* These snakes have a short thick body and a wide head which is much broader than the neck. Usually, there is a zig-zag stripe down the back; colors may be gray, olive-brown, reddish or yellowish. The European viper averages 2 to 3 feet in length. There are 8 species on the European continent; these snakes sometimes are known also as adders or asps.

(2) *Habits.* Vipers generally are found in the wilder areas, particularly in rocky planes, such as in the Pyrenees, the Appenines, and in the Balkan

Figure C–7. Distribution of poisonous snakes of Central and South America.

Rattlesnakes

Found from Southern Mexico down to about 32° S. latitude. Occur in dry hilly country but not in tropical rain forests. Have not been found in Panama or in the Amazon Basin.

Bushmasters

Found at low altitudes on both coasts of eastern Costa Rica south to the coast of Brazil, along the state of Bahia, and on Trinidad.

Fer-de-Lance Group

Found in Martinique, St. Lucia, Trinidad, Southern Mexico and all of Central America and South America with the exception of all of Chile and the Andean highlands above 10,000 feet.

Coral Snakes

Found in all of Mexico, Central America, South America and Trinidad, down to and including the territory of Rio Negro in Argentina.

Sea Snakes

Found in the waters of the Pacific Coast from the Gulf of California to Ecuador.

There are no poisonous snakes in all of the Caribbean Islands, except Martinique, St. Lucia and Trinidad. Chile and the Andean highlands above 10,000 feet have no poisonous snakes.

Figure C–7—Continued.

mountains, where they may be found at heights up to 5,000 feet. They are found as far north as 67° in Scandinavia and across Siberia. Sunlit slopes, moors and heaths, grain fields, and trash piles are favorite prowling places. Some of the European vipers are aggressive and savage, causing occasional deaths.

d. African Vipers.

(1) *Description.* The vipers of North Africa

Figure C–8. Snakes of Europe, Africa, and the Near East.

are similar to those of Europe, except for the puff adder. This is a large brownish or sand-colored snake with striking markings, a heavy body, and a very short tail. This snake grows to a length of 5

EGYPTIAN COBRA

MAMBA

SNAKES OF EUROPE, AFRICA AND NEAR EAST

Figure C–8—Continued.

feet. Central Africa and South Africa have several additional kinds of vipers. Among the largest are the rhinoceros viper and the gaboon viper. The rhinoceros viper, found in West Africa, has horns on

its nose, a very wide head, and a thick body covered with colored marks down the back; it reaches a maximum length of 4 feet. The gaboon viper has one horn on the nose, a wide head, and thick body with oblong markings on the back, and triangular colored spots on the sides; it has been known to reach a length of 6 feet. There are a number of other African vipers, most of them small; with the exception of one kind, they have a wide head and thick body.

(2) *Habits.* The puff adder prefers open forest or grasslands near streams. The rhinoceros viper is found in or near streams. The gaboon viper lives in heavy forest. The bite of any of these snakes is extremely dangerous; however, these snakes are not aggressive nor are they inclined to bite. The smaller vipers, found in sandy country, open brush, grassland, or light forests, are likely to be aggressive and dangerous in spite of their small size. One of the smaller kinds buries itself in the sand and may strike at a passing man; its presence is disclosed by a characteristic coiling pattern in the sand.

e. Cobras.

(1) *Description.* There are several varieties of cobras in Africa and the Near East. The cobras of this area may be black, brown, gray or yellowish, and with or without markings. Cobras often are 6 to 7 feet long; one kind—the water cobra—may attain 8 feet.

(2) *Habits.* The cobras of Africa and the Near East can be found in almost any habitat. One kind lives in or near water; another may climb trees. Some of the cobras in this area are reported to be

aggressive and savage. The fairly common Egyptian cobra of North Africa and adjacent regions is found often around rocky places and ruins. The distance the cobra can strike in a forward direction is equal to the distance the head is raised above the ground. Some cobras, however, can spit venom a distance of 10 to 12 feet; this venom is harmless unless it gets into a man's eyes, in which case it may cause blindness if not washed out immediately. It is particularly dangerous to poke around in holes and rock piles because of the possibility of encountering a spitting cobra.

f. Mambas.

(1) *Description.* These snakes are very slender and have small heads. They generally have a green or dark, uniform color without conspicuous spots or markings. The scales are smooth, symmetrical, and large. Mambas attain lengths up to 12 feet. An 8-foot mamba is about half the thickness of an ordinary broomstick. It is difficult to identify mambas positively. The fangs in an 8-foot snake are only about ½ inch long, the thickness of a pin, and almost covered with flesh.

(2) *Habits.* Mambas are found over all of Africa, except in the extreme northern portions. The South African mambas may be found from Tanzania in the East to West Africa south of the Congo; it has two color phases—one black and one green. The green mamba is found in West Africa, from the Senegal to the Niger. Mambas live in trees or on the ground and have been known to enter houses in search of rats. They are very quick snakes. They may attack deliberately during their

breeding season, but at other times they are timid and glide away. The bite of the mamba is very dangerous.

g. Distribtution of Poisonous Snakes of Europe, Africa and the Near East. See figure C–9.

C–7. Poisonous Snakes of Australia, New Guinea and the Pacific Island

(fig. C–10)

a. Sea Snakes. See paragraphs C–3 and C–5 and figures C–1 and C–6.

b. Copperheads. See paragraph C–4 and figure C–4.

c. Death Adders.

(1) *Description.* This snake has a short, thick, clumsy body with a head much wider than the neck, and a short thin tail. It seldom grows more than 2 feet long. It may be gray, brown, pink, or brick-red, depending on the sandstone of the region in which it lives and into which its camouflage blends skillfully. There are bands of darker color across the body, particularly in the young snakes. The death adder has rough scales and has a spine on the tail.

(2) *Habits.* This snake is found in sandy localities over most of Australia except Victoria, and in southern New Guinea and the Moluccas. Because the death adder resembles the ground it inhabits, it is not likely to be seen. While the snake is not quick to strike, it can be dangerous if irritated or stepped on. The venom of this snake is highly poisonous.

d. Tiger Snakes.

(1) *Description.* The tiger snake has dark

Europe, West of the Volga

Vipers are the only poisonous snakes found. There are no snakes in Ireland.

Near East and Africa (North of 20° North)

Cobras and vipers are found in this area.

Africa (South of 20° North)

Cobras, vipers, mambas and coral snakes are found in this area. There are sea snakes on the east coast of Africa and in the Persian Gulf. There are no poisonous snakes on Madagascar.

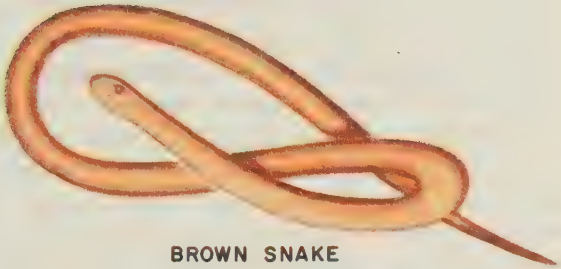
Figure C–9. Distribution of poisonous snakes of Europe, Africa and the Near East.

DEATH ADDER

TIGER SNAKE

Figure C–10. Snakes of Australia, New Guinea and the Pacific Islands.

BLACK SNAKE



BROWN SNAKE

SNAKES OF AUSTRALIA, NEW GUINEA, AND PACIFIC ISLANDS

Figure C–10.—Continued

bands on a tawny background of green, gray, orange, or brown; sometimes the bands are indistinct. It has a stout body with a rather wide head. It averages about 4 to 5 feet long when full grown, but may reach 6 feet. The tiger snake spreads its neck when angry.

(2) *Habits.* This snake lives in dry country, ranging extensively throughout Australia and Tasmania. It is a savage and dangerous reptile which causes more deaths in Australia than all the other snakes combined which are found there. Tiger snakes are quick to bite, spreading the neck and lunging with a flashing stroke that is so vigorous it sometimes moves the snake's body forward so that the snake seems to be making a short jump.

e. Brown Snakes.

(1) *Description.* This is a slender snake with a small narrow head; it usually attains a length of 4 to 5 feet. The eyes are large. The color is light yellow to brown or gray above, and white underneath; the young are pale brown and have a pretty ringed pattern. There are about a dozen relatives of this snake some of which are called whip snakes. In spite of the small size of the head, the venom of this snake is highly poisonous.

(2) *Habits.* The brown snake is widely distributed all over Australia and is found also in New Guinea. It is not an aggressive snake unless it is disturbed. It strikes from a looped position.

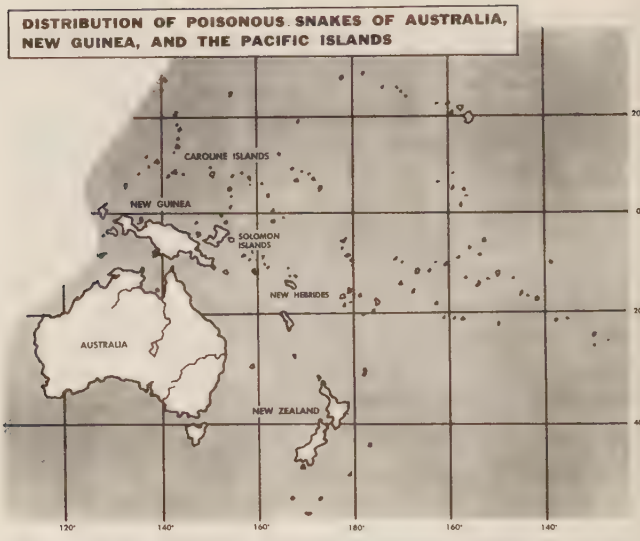
f. Black Snakes.

(1) *Description.* The black snake is blue-black on top and brilliant scarlet underneath, edged with black. The scales are symmetrical and satiny-

smooth. This snake averages 6 to 7 feet long, and has a slender body and a small narrow head. It spreads the neck at the least feeling of alarm.

(2) *Habits.* This snake is found throughout Australia, except in the north and Tasmania. It prefers marshy places or streams; it dives and swims well and can stay under water for long periods of time. Because it lies still on the bottoms of streams, it may be dangerous to bathers. The black snake will not attack unless stepped on or cornered. When angry it raises its head a few inches from the ground on a slanting plane and strikes from that position. While more people in Australia are bitten by the black snake than any other kind, its venom is relatively weak and very few victims die of the bite.

g. Distribution of Poisonous Snakes of Australia, New Guinea and the Pacific Islands. See figure C–11.



Australia, New Guinea, New Hebrides, The Carolines, The Solomons and Adjacent Islands

Nearly all the snakes in this area are poisonous. The most dangerous snakes are the tiger snake, the brown snake, the black snake, the copperhead, the death adder and the taipan. Of these, only the death adder and brown snake occur in New Guinea.

Islands East of New Zealand, New Hebrides and The Carolines

There are no poisonous land snakes. The sea snake is the only poisonous snake in this area. In Australia, several snakes have names which are the same or similar to those of snakes in the United States. However, they are not the same snakes and do not resemble the U. S. snakes of the same names.

Figure C–11. Distribution of Poisonous Snakes of Australia, New Guinea, and the Pacific Islands.

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By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

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